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A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 170)

AUGUST 1977

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

STAR (N-10000 Series)	N77-22042—N77-24051
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NASA SP-7011 (170)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 170)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in July 1977 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 160 reports, articles and other documents announced during July 1977 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1977 Supplements.

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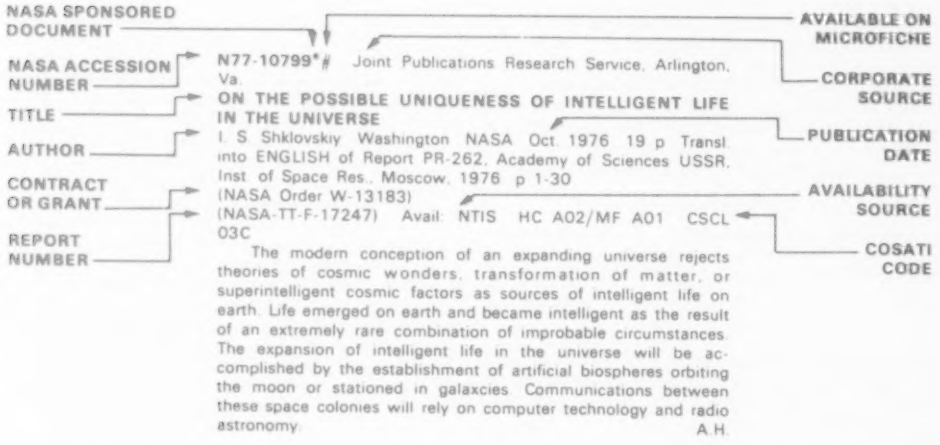
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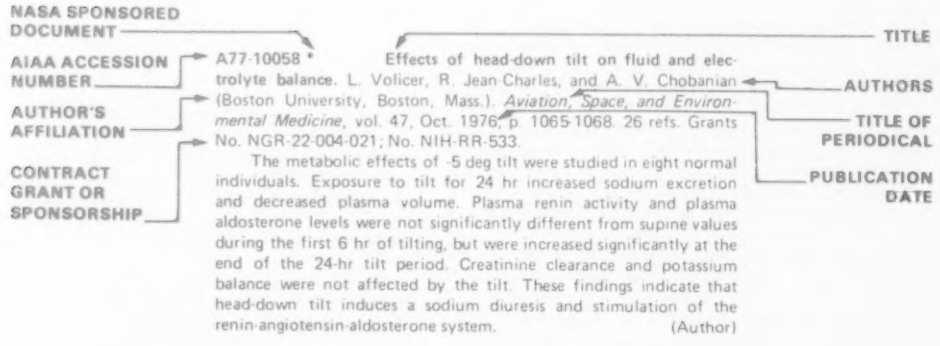
N77-10799*# Joint Publications Research Service, Arlington, Va.
ON THE POSSIBLE UNIQUENESS OF INTELLIGENT LIFE IN THE UNIVERSE
I. S. Shklovskiy Washington NASA Oct. 1976 19 p Transl. into ENGLISH of Report PR-262, Academy of Sciences USSR, Inst. of Space Res., Moscow, 1976 p 1-30
(NASA Order W-13183)
(NASA-TT-F-17247) Avail: NTIS HC A02/MF A01 CSCL 03C
The modern conception of an expanding universe rejects theories of cosmic wonders, transformation of matter, or superintelligent cosmic factors as sources of intelligent life on earth. Life emerged on earth and became intelligent as the result of an extremely rare combination of improbable circumstances. The expansion of intelligent life in the universe will be accomplished by the establishment of artificial biospheres orbiting the moon or stationed in galaxies. Communications between these space colonies will rely on computer technology and radio astronomy.
A.H.

TYPICAL CITATION AND ABSTRACT FROM *IAA*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A77-10058 * Effects of head-down tilt on fluid and electrolyte balance. L. Volicer, R. Jean-Charles, and A. V. Chobanian (Boston University, Boston, Mass.). Aviation, Space, and Environmental Medicine, vol. 47, Oct. 1976, p. 1065-1068. 26 refs. Grants No. NGR-22-004-021; No. NIH-RR-533.
The metabolic effects of -5 deg tilt were studied in eight normal individuals. Exposure to tilt for 24 hr increased sodium excretion and decreased plasma volume. Plasma renin activity and plasma aldosterone levels were not significantly different from supine values during the first 6 hr of tilting, but were increased significantly at the end of the 24-hr tilt period. Creatinine clearance and potassium balance were not affected by the tilt. These findings indicate that head-down tilt induces a sodium diuresis and stimulation of the renin-angiotensin-aldosterone system.
(Author)

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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 170)

AUGUST 1977

IAA ENTRIES

A77-30099 **Intramodal and intermodal transfer of movement information.** G. L. Diewert and G. E. Stelmach (Wisconsin, University, Madison, Wis.). *Acta Psychologica*, vol. 41, Apr. 1977, p. 119-128. 14 refs. Research supported by the University of Wisconsin; U.S. Department of Health, Education, and Welfare Grant No. NE-G-3-0009; Grant No. NIH-MH-22081-01.

Transfer of movement information between and within the visual and kinesthetic sensory systems was examined using a linear movement task. The amount of information to be transferred and the methods of reproduction were standardized by using a single light as a visual stimulus and by examining passive movements. The results, in terms of absolute error, indicated that intramodal matching was as proficient as intermodal matching at short distances with intermodal matching becoming less proficient as movement length increased. Contrary to Connolly and Jones (1970), transfer from vision to kinesthesis was as proficient as transfer from kinesthesis to vision except at longer distances where transfer from vision to kinesthesis had less error than transfer from kinesthesis to vision. The results support a model characterized by little difference in transfer ability except at long distances where it appeared that transfer did not occur until reproduction. The Connolly and Jones model of transfer is inappropriate due to the lack of research and the inability of such models to account for all types of observed performance. (Author)

A77-30133 # **The human eye, an instrument for nondestructive testing.** F. Michalski (Röchling-Burbach, Völklingen, West Germany), M. Stadthaus (Bundesanstalt für Materialprüfung, Berlin, West Germany), and D. Kaiser (Mannesmann AG, Muelheim, West Germany). In: World Conference on Nondestructive Testing, 8th, Cannes, France, September 6-11, 1976, Proceedings. Paris, Institut de Soudure, 1976, Section 3A, Paper 3A-3. 7 p. 11 refs.

Nondestructive testing relies on human assistance and there is a close relationship between test equipment, material to be tested, and the inspecting person, especially with magnetic particle and liquid penetrant test methods. The capabilities of the human eye and their significance in flaw detection under various conditions are discussed. Attention is directed to the relationship between visual surface testing and eye functions along with detection and correction of eye anomalies. The end result will be a better discrimination between real and apparent defects with increased reliability of test results and guaranteed quality of the inspected part. S.D.

A77-30225 # **Physicochemical properties of a liquid ion exchanger microelectrode and its application to biological fluids.** M. Fujimoto and T. Kubota (Osaka Medical College, Takatsuki, Japan). *Japanese Journal of Physiology*, vol. 26, no. 6, 1976, p. 631-650. 18 refs.

The paper describes the method of fabricating liquid ion exchanger microelectrodes, especially double barreled K(+) or Cl(-) ion-selective microelectrodes, and examines their biological applicability. A reliable technique is devised in which one barrel is a PD sensor and the other is a chemical or ionic sensor. The use of ion-selective microelectrodes in the intracellular measurement of ionic activity is discussed. To confirm the applicability of the ion-selective microelectrodes to biological samples, the ionic activity of K(+) and Cl(-) is determined both in vitro and in vivo for human serum, frog serum, frog Ringer solution, and egg white. S.D.

A77-30299 **Some studies on the subjective doubling of low frequency whole-body vibrations.** B. K. N. Rao (Birmingham, University, Birmingham, England). *Journal of Sound and Vibration*, vol. 51, Mar. 22, 1977, p. 308-310.

A77-30300 **Experimental production of manifest and concealed ventricular rhythms in man.** J. K. Bissett, J. J. Kane, N. de Soyza, J. R. McConnell, and N. Schmitt (U.S. Veterans Administration Hospital, Little Rock, Ark.). *Journal of Electrocardiology*, vol. 10, Apr. 1977, p. 111-118. 12 refs. Research supported by the U.S. Veterans Administration.

Electrophysiologic experiments were performed on 12 patients aged 38-60 yr with normal PR intervals and QRS complexes, undergoing diagnostic catheterization for evaluation of stable chest pain, in order to investigate the production of concealed (nonconducted) and manifest ventricular rhythms in the human ventricle using programmed ventricular stimulation. Following the introduction of stimuli near the ventricular effective refractory period, extrastimuli after each sinus beat are applied greater than 40 msec outside the ventricular effective refractory period in three cases associated with different current levels. The study demonstrates the experimental production of manifest and concealed ventricular rhythms in man. The results illustrate the importance of the post-extrasystolic pause in the production of concealed ventricular rhythms. Changes in the ventricular effective refractory period during this pause appear to account for the different effects of ventricular stimuli applied at various intervals from the refractory period at identical current levels. S.D.

A77-30631 # **Performance of an elastodynamic pump - Cardiac model.** W. H. Hoppmann, II (South Carolina, University, Columbia, S.C.) and J. C. C. Liu (U.S. Army, Materiel Systems Analysis Agency, Aberdeen Proving Ground, Md.). In: Southeastern Conference on Theoretical and Applied Mechanics, 8th, Blacksburg, Va., April 29, 30, 1976, Proceedings. Blacksburg, Va., Virginia Polytechnic Institute and State University, 1976, p. 509-513.

Several types of pumps are usually treated in publications of engineering Societies such as the ASME and the AICHE. Peculiarly the type resembling the mammalian heart is never considered. In the present paper an attempt is made to remedy the situation by at least presenting a single example. Accordingly a standard treatment of what we call an elastodynamic pump, one for which the shape changes during a flow cycle, is provided. The method of test is described and flow characteristic curves are shown. Experimental results are briefly discussed. (Author)

A77-30876 **Stress responses of pilots flying high-performance aircraft during aerial combat maneuvers.** R. R. Burton, W. F. Storm, L. W. Johnson, and S. D. Leverett, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 301-307. 10 refs.

In aerial combat maneuvers (ACMs), eight pilots flew their two F-15 aircraft against nine pilots in three F-106 aircraft. A total of nine flights, consisting of 23 ACMs, were accomplished in 5 successive days. The degrees of fatigue, stress, and sympathetic activity were quantified using both subjective analysis and the biochemical constituents in the urine of the pilots of the F-15 or F-106. Biomedical indicators, reported per 100 mg creatinine, included epinephrine, norepinephrine, 17-OHCS, urea, inorganic phosphate, sodium, potassium, and sodium/potassium ratio. The F-106 pilots exerted more relative effort than did the F-15 pilots - effort which appeared to be associated with high-G experience. Both groups of pilots were equally fatigued following ACMs. Sympathetic and stress responses during the ACM showed postflight increases of 54% in epinephrine, 19% in norepinephrine, and 20% in 17-OHCS over preflight values, thus suggesting a moderate stress response. By late afternoon, postflight values for these indicators had returned to near-preflight levels. (Author)

A77-30877 **Thermal problems in plethysmography and pressure/volume recording.** L. Vanggaard and J. Ostergaard (Copenhagen, University, Copenhagen, Denmark). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 308-310. 7 refs.

Where volume changes are recorded as the concomitant changes in pressure, modern, fast-responding pressure transducers might record not only the pressure changes due to volume changes in the measured object but also the heat of compression, showing itself as an overshoot or hysteresis phenomenon in the calibration curves. Introduction of an effective heat sink (e.g., copper mesh) within the air space in the plethysmograph might absorb this heat and thereby diminish the overshoot phenomena. The effect is not of practical importance in classical venous occlusion plethysmography where rapid changes only contribute to a smaller part of the total volume change during venous occlusion. When rapid changes, as in volume pulse recordings, are to be evaluated, the effect must be taken into consideration and should be reduced. (Author)

A77-30878 **Asymptotic behavior of temporary threshold shift and recovery from 24- and 48-hour noise exposures.** C. W. Nixon, D. L. Johnson, and M. R. Stephenson (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 311-315. 12 refs.

Temporary hearing loss (TTS) from long-duration noise exposure reaches an asymptote between 8 and 16 hr and does not increase further during continued exposure for durations of at least 48 hr. Potential auditory hazards of long-duration exposures are examined in terms of growth and recovery patterns of TTS. TTS growth and recovery patterns were compared during 24- and 48-hr exposures of humans to continuous pink noise at a level of 85 dB A-weighted. Results indicate similar patterns of acquisition and relatively equal amounts of TTS for the two exposure durations. However, recovery of preexposure hearing at 4000 Hz following termination of the 48-hr noise exposure differed somewhat from that which followed the 24-hr exposure. The implications of these findings for long missions in noisy environments are discussed. (Author)

A77-30879 **Motion sickness suceptibility and related behavioral characteristics in men and women.** J. M. Lentz (U.S. Naval Aeromedical Research Laboratory, Pensacola, Fla.) and W. E. Collins (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 316-322. 12 refs.

The incidence of motion sickness in a large (N = 3,618) college population was determined by means of a questionnaire. The test-retest reliability coefficient (0.84) suggested that the motion sickness questionnaire (MSQ) for this particular population yields highly consistent information. Significantly greater proportions of men than women had low susceptibility scores and, conversely, significantly greater proportions of women had high susceptibility scores. The relationships between motion sickness susceptibility scores and several behavioral characteristics in men and women were also investigated. Specifically, comparisons of MSQ scores were made with other self-assessments, age changes, motion experiences, familial susceptibility, use of motion sickness medication, muscular coordination, willingness to participate in motion experiments, flying experience, phobias, visual motion effects, and use of alcohol. (Author)

A77-30880 **Effects of high O2 and N2-O2 pressures on the physical performance of deer mice - Preliminary studies.** M. A. Rokitka and H. Rahn (New York, State University, Buffalo, N.Y.). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 323-326. 12 refs. Contract No. N00014-71-C-0342.

Exposure of deer mouse colonies to oxygen tensions of 0.8, 1.0 and 1.5 ATA are accompanied by reductions in wheel-running activity. The magnitude of the reductions was correlated with the partial pressure of oxygen and duration of exposure. Efforts to minimize the toxic effects of high-pressure oxygen by simultaneous exposure to a high nitrogen tension were not effective. Earlier studies showed that exposure to 13.8 atm nitrogen under normoxic conditions reduced running activity by 10%. When this same nitrogen tension was provided in each of the elevated oxygen environments, wheel-running activity deteriorated in a manner comparable to that observed in the absence of added nitrogen. Visual observations of social behavior and respiratory distress suggest that a nitrogen tension of 13.8 atm does not provide protection against oxygen toxicity. (Author)

A77-30881 * **Tolerance of females to +Gz centrifugation before and after bedrest.** B. D. Newsom, W. L. Goldenrath, H. Sandler (NASA, Ames Research Center, Moffett Field, Calif.), and W. R. Winter (NASA, Ames Research Center, Moffett Field; NASA, Flight Research Center, Edwards, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 327-331. 9 refs.

Because women may be included as passengers in the proposed Space Shuttle System, experiments were conducted on 12 female subjects aged 24-35 yr to investigate the +Gz tolerance of women and the possible degradation of this tolerance after a period of weightlessness as simulated by bedrest. Over a 1-week period, each subject was exposed to +Gz levels starting at +2 Gz and increasing by 0.5 Gz increments to a gray-out point. This point was determined by peripheral vision loss with a standard lightbar and by reverse blood flow in the temporal artery. Ultimately, each woman was subjected to three runs at the +3 Gz level for about 55 min long each, separated by 5-min rest periods. Eight subjects with the best tolerance times were selected for 14 days of bedrest in a horizontal position; the other four being ambulatory controls. Tests before bedrest, immediately following, and 5 d later showed that average +Gz tolerance decreased by 67% after bedrest. (Author)

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A77-30882 * **Femur-bending properties as influenced by gravity. I - Ultimate load and moment for 3-G rats.** C. C. Wunder, R. C. Welch, R. Glade, B. P. Fleming (Iowa, University, Iowa City, Iowa), and K. M. Cook (Coe College, Cedar Rapids, Iowa). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 339-346. 40 refs. Grant No. NGR-16-001-031.

Fresh experimental bones can withstand greater bending forces and moments after 1.0 to 2.5 weeks of 3-G exposure. This appears more attributable to a 50% greater strength of bone material than to effects upon size or shape, and is most measurable for animals of 5 to 8 weeks of age. Experimental bone material seems to grow to its mature level at a younger age rather then there being so marked an effect upon the mature level itself. We simulated 3.1 G by chronic centrifugation of 66 albino rats and compared them to 63 1-G controls. Extrapolation of the simplest mathematical description of the present results to weaker, zero-G bones could be tested by a total of 60 space-based control and experimental animals. A flight of only 15 animals would be necessary for comparison to ground-based control animals. This is consistent with reports of bone demineralization during space-flight. In light of the differences in bone histology, however, extrapolation of these results to humans would be premature and, if at all applicable, are most likely to be so for children rather than adults. (Author)

A77-30883 **Changes in local brain tissue PO2 and electrocortical activity of unanesthetized rabbits under high oxygen pressure.** D. Torbati, D. Parolla, and S. Lavy (Jerusalem, Hebrew University, Jerusalem, Israel). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 347-350. 16 refs.

A77-30884 **Changes in tissue glycogen stores of rats under acute and chronic hypoxia and their relationship to hypoxia tolerance.** T. Purshottam, U. Kaveeshwar, and H. D. Brahmachari (Defence Research and Development Establishment, Gwalior, India). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 351-355. 22 refs.

A77-30885 * **Labyrinth and cerebral-spinal fluid pressure changes in guinea pigs and monkeys during simulated zero G.** D. E. Parker (Miami University, Oxford, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 356-361. 17 refs. Research supported by Miami University; Contract No. NAS9-14538.

This study was undertaken to explore the hypothesis that shifts of body fluids from the legs and torso toward the head contribute to the motion sickness experienced by astronauts and cosmonauts. The shifts in body fluids observed during zero-G exposure were simulated by elevating guinea pigs' and monkeys' torsos and hindquarters. Cerebral-spinal fluid pressure was recorded from a transducer located in a brain ventricle; labyrinth fluid pressure was recorded from a pipette cemented in a hole in a semicircular canal. An anticipated divergence in cerebral-spinal fluid pressure and labyrinth fluid pressure during torso elevation was not observed. The results of this study do not support a fluid shift mechanism of zero-G-induced motion sickness. However, a more complete test of the fluid shift mechanism would be obtained if endolymph and perilymph pressure changes were determined separately; we have been unable to perform this test to date. (Author)

A77-30886 **Protective effect of hypoxia on oxygen toxicity - Possible mechanisms.** R. E. Brashear, J. C. Christian, K. W. Kang, and R. J. Rohn (Indiana University, Medical Center, Indianapolis, Ind.). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 362-365. 25 refs.

Male Sprague-Dawley rats, approximately 51-57 days old and distributed in four groups, were respectively exposed to 5 days of compressed air followed by 52 hr of greater than 99% oxygen (referred to as oxygen), to 5 days of hypoxia followed by 52 hr of oxygen, to compressed air for 172 hr, and to hypoxia for 5 days. Blood and lung lavage were used for protein and phospholipid studies. Arterial hematocrits, total leukocyte cell counts, and leucocyte differential counts were obtained. Polycythemia was produced in eight rats by intraperitoneal injections of 2 ml packed rat red blood cells daily for 4 days. The possibility that polycythemia was responsible for the increased survival in rats pretreated with hypoxia and subsequently placed in oxygen was reasonable eliminated by the polycythemia study. Survival during oxygen breathing of rats previously treated with hypoxia may be related to maintaining normal alveolar lecithin. The lung lavage phospholipids seem to demonstrate a metabolic marker that differentiates oxygen-breathing rats from air-breathing rats or oxygen-breathing rats pretreated with hypoxia. S.D.

A77-30887 **Systematic desensitization of a phobia for flying with the use of suggestion.** S. A. Timm (U.S. Naval Regional Medical Center, Bremerton, Wash.). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 370-372. 6 refs.

A77-30888 **Medical waivers - An extension of the pilot's career.** A. Johnson, Jr. (USAF, Aeromedical Services, Scott AFB, Ill.). *Aviation, Space, and Environmental Medicine*, vol. 48, Apr. 1977, p. 373-376. 10 refs.

In order to monitor the personnel on flying status in a dynamic state of life, the aircrew member must be evaluated periodically to determine his state of health, and if appropriate, the flight surgeon must request waivers for certain diseases and ilnesses and injuries. A waiver means that the individual is considered by the reviewing authority to be capable of effective performance of duty without compromising the health or safety of himself or others, despite failing to meet the medical standards for flying duties. A review of materials and methods for granting waivers reveals that the medical waiver provides a means to continue rated officers on flying duties, thereby extending their careers as aircrew members. The challenge of the future will be to maintain the aircrew members in excellent physical and mental health by identifying medical problems early before they cause symptoms, by providing improved medical care for acute illnesses and injuries, and by being realistic and progressive in the approach to aircrew members. Percentage of waivers granted according to system disorders is noted. S.D.

A77-30925 # **Theoretical prerequisites for the development of artificially heated clothing (Teoretichni peredumovi do stvorennia odiagu z shtuchnim obigrivom).** I. M. Naumenko (Akademiia Nauk Ukrains'koi RSR, Institut Problem Materialoznavstva, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologichni, Khimichni ta Biologichni Nauki*, Feb. 1977, p. 164-168. In Ukrainian.

A theoretical analysis of the efficiency of local heating of the human body at low ambient temperatures is performed. An arrangement for local heating elements making effective use of metabolic heat is proposed. P.T.H.

A77-30949 **Holographic investigation of stapes footplate movements.** K. Hogmoen (Norges Tekniske Hogskole, Trondheim, Norway) and T. Gundersen (Trondheim, Universitetet, Trondheim, Norway). *Acustica*, vol. 37, Apr. 1977, p. 198-202. 11 refs.

Time-average holography has been applied to measure movements of the stapes footplate. The investigations were performed on fresh human temporal bone preparations with the stapes unloaded by the cochlear fluid. By using the technique with a phase modulated reference wave, a smaller tilt movement was detected in addition to the piston-like movement at 120-125 dB sound pressure level and 600 Hz frequency. (Author)

A77-30968 # **Combined effect of flight factors (Kombinirovannoe deistvie faktorov poleta).** V. V. Antipov and B. I. Davydov. *Kosmicheskie Issledovaniia*, vol. 15, Mar.-Apr. 1977, p. 286-297. 59 refs. In Russian.

Domestic and foreign investigations of the combined effects on the human organism of acceleration, vibration, weightlessness, temperature, ionizing radiation, hypoxia, and hypodynamia are

reviewed and systematized. An attempt is made to determine the mechanism of the interaction of pairs of factors. M.L.

A77-31023 **The assessment of motor control in sighting dominance using an illusion decrement procedure.** C. Porac (Victoria, University, Victoria, British Columbia, Canada) and S. Coren (British Columbia, University, Vancouver, Canada). *Perception and Psychophysics*, vol. 21, no. 4, Apr. 1977, p. 341-346. 37 refs. National Research Council of Canada Grants No. A-0293; No. A-9783; Medical Research Council of Canada Grant No. MA-5382.

Walls (1951) proposed that perceptual asymmetries between the sighting dominant and the nonsighting dominant eyes were based upon differences in the monitoring of eye movements. The present research explored this hypothesis in the context of an illusion decrement paradigm. Since illusion decrement seems to occur only under conditions of free eye-movement inspection, it was reasoned that any motoric asymmetries would manifest themselves through differences in the rate and extent of decrement. These predictions were partially confirmed. The sighting eye manifested greater illusion decrement, but the effect remained specific to conditions where both eyes were stimulated. In addition, asymmetries in the interocular transfer of illusion decrement were found to favor the sighting dominant eye. (Author)

A77-31024 **The effect of alcoholic intoxication upon calorically induced oculogyral illusion.** R. B. Welch, D. J. Schroeder, J. K. Thurgate, C. K. Erickson, R. L. Higgins, and J. S. Wait (Kansas, University, Lawrence, Kan.). *Perception and Psychophysics*, vol. 21, no. 4, Apr. 1977, p. 352-356. 21 refs. Research supported by the University of Kansas.

Ten male and 10 female subjects, half of whom were classified as 'heavy' and half as 'light' drinkers, ingested a 4-1 combination of tonic water and 80-proof vodka in an amount calculated to produce a state of moderate intoxication (average estimated peak blood alcohol level = .075). This resulted in an increased sensitivity (latency, magnitude, and duration) to the calorically induced 'oculogyral illusion' (OGI) relative to a placebo (tonic water) condition. 'Heavy' and 'light' drinkers did not differ significantly on any of the measures. It was speculated that the alcoholic enhancement of the OGI was due either to a decreased ability to suppress vestibular nystagmus when attempting to fixate a visual stimulus or to the expenditure of extra-normal effort in order to maintain fixation. (Author)

A77-31025 **Discrimination of spatial and temporal intervals defined by three light flashes - Effects of spacing on temporal judgments and of timing on spatial judgments.** C. E. Collyer (Rhode Island, University, Kingston, R.I.). *Perception and Psychophysics*, vol. 21, no. 4, Apr. 1977, p. 357-364. 14 refs.

A77-31027 **The evaluation of human exposure to helicopter vibration.** M. J. Griffin (Southampton, University, Southampton, England). *Aeronautical Journal*, vol. 81, Mar. 1977, p. 110-123. 49 refs. Research supported by the Ministry of Defence.

Techniques for assessing vibration effects are examined and problems in choosing aircraft vibration limits are discussed. An appendix on the evaluation of human exposure to helicopter vibration analyzes whole body vibration of aircrew, legibility of vibrating instruments, and vibration of peripheral parts of the body. A second appendix works examples, and a third explains the derivation of the vibration evaluation procedure M.L.

A77-31037 **Electronic high speed sector scan ultrasonic tomography improved in directivity by using signal processing technique.** M. Okujima and N. Endoh. *Research Laboratory of Precision Machinery and Electronics, Bulletin*, Sept. 1976, p. 1-8. 7 refs. Research supported by the Ministry of Welfare.

A77-31046 **Effect of hematocrit on electrocardiograph potentials and dipole moment of the pig.** B. C. Hodgkin, R. W Millard, and C. V. Nelson (Maine Medical Center, Portland, Me.) *American Journal of Physiology*, vol. 232, Apr. 1977, p. H406-H41 19 refs. Research supported by the Maine Heart Association; Gran No. NIH-HL-13942; No. NIH-HL-10436.

A77-31123 **A quantum fluctuation model for foveal colo thresholds.** R. W. Massof (Johns Hopkins University, Baltimor Md.). *Vision Research*, vol. 17, no. 4, 1977, p. 565-570. 20 refs. NS Grant No. GB-40516.

A model for foveal color thresholds built on two principl assumptions: (1) foveal receptor response thresholds are limited b quantum fluctuations and (2) color appearance is the result of a opponent transformation of the receptor outputs, is presented in th paper. This model accounts for the foveal achromatic interva threshold color-name fluctuations, and the wavelength dependenc of the slopes of the color-detection functions. (Autho

A77-31124 **A model of threshold vision incorporatin inhomogeneity of the visual field.** J. O. Limb and C. B. Rubinstei (Bell Telephone Laboratories, Inc., Holmdel, N.J.). *Vision Researc* vol. 17, no. 4, 1977, p. 571-584. 24 refs.

We evaluate a one-dimensional, single-channel model of thres old vision. The model closely predicts the experimental outcome fo four classes of stimuli. Three classes of stimuli consist of vertical lin and bars, brighter and darker than the background. The fourt stimulus is a sinusoidal grating. Our study differs from previou quantitative models in that (1) a space-variant filter is used t account for the inhomogeneity in the visual system and (2) the effec of noise is taken into account in determining the form of the impuls response. A stimulus consisting of two vertical lines, where th spacing between the lines is a variable, was used to evaluate th parameters of the model in the fovea and at eccentricities of 50, 10 200, 300, and 500'. The form of the impulse response changed litt between the fovea and the 500' position, but the spread increased b a factor of about two. (Autho

A77-31125 **Temporal characteristics of the human visua system as revealed by reaction time to double pulses of light.** T Ueno (Osaka City University, Osaka, Japan). *Vision Research*, vo 17, no. 4, 1977, p. 591-596. 24 refs.

Reaction time to double light pulses was measured as a functio of the stimulus onset asynchrony at four different adaptin luminance levels. As adapting luminance increases, the critica duration for complete summation decreases. The time at which th maximum inhibition occurs, also decreases with the increase adapting levels. At the highest adapting levels used, inhibition i strong and observed clearly at about 30 msec, whereas under dar adaptation, it is weak and long-continued, ranging from about 85 t 400 msec. (Autho

A77-31264 **Where life begins.** C. Wickramasinghe (Univer sity College, Cardiff, Wales). *New Scientist*, vol. 74, Apr. 21, 1977, p 119-121.

Evidence for the formation of complex organic molecules including polymers, in dense interstellar clouds and proto-stella cloud complexes, and possible deposition of such material on th prebiotic earth, are considered. Organic molecules detected i cometary dust, meteoritic materials, and meteoroids, radio astro nomical data and UV data on such molecules in dense molecula clouds, and comparison of the UV absorption spectra of some compounds and material in carbonaceous chondrites or in outer space are discussed. Tabular data are presented on inorganic and organic molecules of interest detected spectroscopically in molecular clouds. Reports of microfossils in material of extraterrestrial origin and comparisons with pollen microfossils in Pre-Cambrian sediments are evaluated, along with the implications for exobiological studies. R.D.V.

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A77-31437 **Stability and stabilization of programmed motions of a manipulator robot.** A. V. Timofeev and Iu. V. Ekalo. (*Avtomatika i Telemekhanika*, Oct. 1976, p. 148-156.) *Automation and Remote Control*, vol. 37, no. 10, Mar. 20, 1977, pt. 2, p. 1592-1599. 10 refs. Translation.

Control laws are synthesized for controlling the moments of actuators of a robot manipulator, which ensure stability of its programmed movements under different degrees of information on the dynamic equations. The laws ensure performance of a given programmed movement of the manipulator in the presence of initial disturbances. Computer simulations show that the adaptive stabilization algorithms are reliable under these circumstances. P.T.H.

A77-31550 **Psychological aspects of cardiac arrhythmia.** J. J. Lynch (Maryland, University, Baltimore, Md.), D. A. Paskewitz, K. S. Gimbel, and S. A. Thomas (Maryland, University Hospital, Baltimore, Md.). *American Heart Journal*, vol. 93, May 1977, p. 645-657. 213 refs.

The paper focuses on collection and integration of material from a wide range of sources that have suggested that psychological-emotional factors can significantly influence and alter the incidence of cardiac arrhythmia. The discussion is limited to cardiac arrhythmia because of its role as a precursor of cardiac arrest and sudden death. Research in this field is classified into five major categories: emotional stress, suggestion and autosuggestion, sleep, classical conditioning, and operant conditioning. While existing data are in many cases difficult to interpret because of theoretical and methodological problems, evidence exists to warrant a concerted investigation into the total involvement of psychological factors in cardiac arrhythmia. S.D.

A77-31587 * **Human-computer interaction in multitask situations.** W. B. Rouse (Illinois, University, Urbana, Ill.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-7, May 1977, p. 384-392. 38 refs. Grant No. NsG-2119.

Human-computer interaction in multitask decisionmaking situations is considered, and it is proposed that humans and computers have overlapping responsibilities. Queueing theory is employed to model this dynamic approach to the allocation of responsibility between human and computer. Results of simulation experiments are used to illustrate the effects of several system variables including number of tasks, mean time between arrivals of action-evoking events, human-computer speed mismatch, probability of computer error, probability of human error, and the level of feedback between human and computer. Current experimental efforts are discussed and the practical issues involved in designing human-computer systems for multitask situations are considered. (Author)

A77-31588 * **Worth assessments of approach to landing.** R. E. Curry (NASA, Ames Research Center, Moffett Field, Calif.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-7, May 1977, p. 395-398.

The objective of worth assessment is to determine a descriptive model of how attributes of a set of objects are combined into preferences for the objects. The technique is described and is applied to the assessment of worth functions in approach to landing for general aviation and air carrier pilots. (Author)

A77-31729 * **A heuristic finite-state model of the human driver in a car-following situation.** G. O. Burnham (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) and G. A. Bekey (Southern California, University, Los Angeles, Calif.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-6, Aug. 1976, p. 554-562. 10 refs. NSF Grant No. GK-41482.

An approach to modeling human driver behavior in single-lane car following which is based on a finite-state decision structure is considered. The specific strategy at each point in the decision tree was obtained from observations of typical driver behavior. The synthesis of the decision logic is based on position and velocity thresholds and four states defined by regions in the phase plane. The performance of the resulting assumed intuitively logical model was compared with actual freeway data. The match of the model to the data was optimized by adapting the model parameters using a modified PARTAN algorithm. The results indicate that the heuristic model behavior matches actual car-following performance better during deceleration and constant velocity phases than during acceleration periods. (Author)

A77-31736 * **Cardiovascular and renal effects of head-out water immersion in man - Application of the model in the assessment of volume homeostasis.** M. Epstein (U.S. Veterans Administration Hospital; Miami, University, Miami, Fla.). *Circulation Research*, vol. 39, Nov. 1976, p. 619-628. 74 refs. Research supported by the U.S. Veterans Administration Research Funds; Grants No. NIH-RR-261; No. NGR-10-007-097.

A77-31743 * **Comparison of isocitrate dehydrogenase activity, pyruvate kinase activity, and polyphenol content in physiologically different pine callus tissue.** J. R. Cowles, J. A. Fowler (Houston, University, Houston, Tex.), and C. H. Walkinshaw (Johnson Space Center, Health Services Div., Houston, Tex.). *Physiologia Plantarum*, vol. 33, 1975, p. 177-181. 8 refs. Contract No. NAS9-13262.

A77-31767 **RF radiation hazards - An engineering status review.** A. R. Kall (Ark Electronics Corp., Willow Grove, Pa.). In: International Symposium on Electromagnetic Compatibility, Washington, D.C., July 13-15, 1976, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1976, p. 215-221. 15 refs.

Microwave radiation is defined as nonionizing radiation over the entire RF spectrum from DC to millimeter waves. Laboratory aspects of RF radiation hazards are considered, taking into account thermal and nonthermal effects, reversible and irreversible effects, long-term low-level effects, the effects of modulation, frequency-related effects, and questions concerning the permissibility of an extrapolation of results on animals to man. Attention is also given to the control of RF radiation and the establishment of threshold limits of tolerable radiation, engineering considerations for transmitting antennas, and portents for the future. G.R.

A77-31772 **On the digital processing of EEG data.** N. Ahmed, D. Hein, D. Walker, D. Parikh, and B. Vujjini (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). In: International Symposium on Electromagnetic Compatibility, Washington, D.C., July 13-15, 1976, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1976, p. 267-271. 6 refs. Research supported by the U.S. Veterans Administration.

The main objective of this paper is to discuss some signal processing aspects pertaining to electroencephalograph (EEG) data. First, digital filters which enable one to extrapolate the THETA and ALPHA components of EEG data are presented. Next, the energy outputs of these filters are used to suggest a plausible quantitive measure for assessing the effectiveness of a biofeedback training process. Some of the related experimental results are also included. (Author)

A77-31800 **New approaches in naval safety research.** R. L. Huston (Cincinnati, University, Cincinnati, Ohio). *Naval Research Reviews*, vol. 30, Apr. 1977, p. 21-28. 25 refs.

Three user-oriented crash-victim computer simulation codes UCIN (developed at the University of Cincinnati) are described. Computer simulation models of the effect of vehicle crashes on humans supplement experiments which use dummies, cadavers,

animals, or human volunteers. UCIN-CRASH, designed to study whole-body, gross-motion, crash-victim dynamics, is modelled as a system of linked rigid bodies representing the various limbs and the torso of the human body. The UCIN-NECK model, for studying the dynamics of the head-neck system in detail, consists of rigid bodies and nonlinear springs and dampers representing the bones, discs, ligaments and muscles of the head-neck system. The UCIN-SUPER model, concerned with the dynamics of general configurations of linked rigid bodies, consists of a series of rigid bodies arbitrarily assembled so that no closed loops are formed. Another crash-victim computer-simulation program, CALSPAN, is also briefly discussed. M.L.

A77-31911 * **Electrolytes and thermoregulation.** B. Nielsen (Copenhagen, University, Copenhagen, Denmark) and J. E. Greenleaf (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, Calif.). In: Drugs, biogenic amines and body temperature; Proceedings of the Third Symposium on the Pharmacology of Thermoregulation, Banff, Alberta, Canada, September 1976. Basel, S. Karger AG, 1977, p. 39-47. 42 refs.

The influence of ions on temperature is studied for cases where the changes in ionic concentrations are induced by direct infusion or injection of electrolyte solutions into the cerebral ventricles or into specific areas of brain tissue; intravenous infusion or injection; eating food or drinking solutions of different ionic composition; and heat or exercise dehydration. It is shown that introduction of Na(+) and Ca(++) into the cerebral ventricles or into the venous system affects temperature regulation. It appears that the specific action of these ions is different from their osmotic effects. It is unlikely that their action is localized to the thermoregulatory centers in the brain. The infusion experiments demonstrate that the changes in sodium balance occurring during exercise and heat stress are large enough to affect sweat gland function and vasomotor activity. S.D.

A77-31912 * **Computer synthesis of high resolution electron micrographs.** R. Nathan (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: Digital processing of biomedical images. New York, Plenum Publishing Corp., 1976, p. 75-88. 5 refs.

Specimen damage, spherical aberration, low contrast and noisy sensors combine to prevent direct atomic viewing in a conventional electron microscope. The paper describes two methods for obtaining ultra-high resolution in biological specimens under the electron microscope. The first method assumes the physical limits of the electron objective lens and uses a series of dark field images of biological crystals to obtain direct information on the phases of the Fourier diffraction maxima; this information is used in an appropriate computer to synthesize a large aperture lens for a 1-A resolution. The second method assumes there is sufficient amplitude scatter from images recorded in focus which can be utilized with a sensitive densitometer and computer contrast stretching to yield fine structure image details. Cancer virus characterization is discussed as an illustrative example. Numerous photographs supplement the text. S.D.

A77-31914 * **A physical comparison of a fluoroscopic CAT system and the EMI head scanner.** N. A. Baily and R. A. Keller (California, University, La Jolla, Calif.). In: Application of optical instrumentation in medicine V. Palos Verdes Estates, Calif., Society of Photo-Optical Instrumentation Engineers (SPIE Proceedings. Volume 96), 1976, p. 210-214; Discussion, p. 215. 12 refs. Grant No. NGR-05-009-257.

A quantitative comparison of the capabilities to produce computerized tomograms was made between the EMI head scanner and reconstructions from images provided by a large screen low light level-TV camera fluoroscopic system. A phantom made from lucite containing rods of various materials and sizes was used. The computer printout of each was analyzed and a correlation of 0.8 was noted between the results of both systems. The differential attenuation detectability of the fluoroscopic system was found to be comparable to or better than the EMI unit. As expected from a consideration of the quantum statistics for each system, the noise in the obtained reconstructions was also comparable. It is concluded that such a fluoroscopic system performs favorably when compared to the presently available commercial systems. (Author)

A77-32002 # **Changes in EEG rhythms in man during switching on and off of the current during an electrotherapeutic sleep session (Izmenenie ritmov E.E.G. cheloveka pri vkliuchenii i vykliuchenii toka vo vremia seansa elektrosna).** L. G. Voronin, R. Ia. Senina, and A. L. Galeev (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino-on-Oka, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 232, Feb. 11, 1977, p. 1204-1207. 8 refs. In Russian.

By recording not the total EEG but rather the individual frequency components, it was possible to record and analyze the biorhythms of the brain during the action of pulsed currents. Statistical and correlation analysis of integrated and averaged (over 2-3-min intervals) recordings of the delta, theta, and alpha rhythms of the occipital zone and the delta and alpha rhythms of the frontal zone was performed at initial switching on and final switching off of the current and during periods of brief switching off and repeated switching on of the current in the middle of electric sleep. The EEG rhythms of the occipital zone show that the most inert and least variable rhythms during switching on and off of the current were the low-frequency delta and theta rhythms, and the most sensitive was the alpha rhythm. P.T.H.

A77-32067 * # **Physiological parameters in space settlement design.** J. Billingham (NASA, Ames Research Center, Moffett Field, Calif.). *American Institute of Aeronautics and Astronautics and Princeton University, Conference on Space Manufacturing Facilities, 3rd, Princeton, N.J., May 9-12, 1977, AIAA Paper 77-549.* 6 p. 12 refs.

One of the major goals of space settlement design is the provision of an environment which will allow full health and effective performance for all members of the population. Attention is given to questions concerning an alternation of 1 G-0 G environment, the physiology of weightlessness, the transit between earth and settlement, research on physiological parameters, and the need for a sensitivity analysis. G.R.

A77-32068 # **Ecopsychiatric aspects of a first human space colony.** J. T. Shurley, K. Natani, and R. Sengel (U.S. Veterans Administration Hospital, Oklahoma City, Okla.). *American Institute of Aeronautics and Astronautics and Princeton University, Conference on Space Manufacturing Facilities, 3rd, Princeton, N.J., May 9-12, 1977, AIAA Paper 77-550.* 9 p. 24 refs. Research supported by the U.S. Veterans Administration Medical Research Program, University of Oklahoma, and NSF.

This paper considers the potential psychosocial problems facing the first technology satellite crew. These include anxiety, depression, hysteria, ineffectual performance, substance abuse, etc. These inferences are drawn from a relevant data base which includes sensory isolation experiments, Antarctic research and others. However, little data is available that bears directly upon the deployment of heterosexual, space colonies. A conceptual approach, based on general systems theory, is presented to organize what data is available and to generate hypotheses to guide the investigative process. From this conceptual approach and from the above data base the authors address possible strategies to deal with anticipated problems. The authors conclude that a full-scale simulation prior to launch and deployment is the best method to test hypotheses and to discover new and emergent behavior patterns. (Author)

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A77-32177 **Effects of body temperature on ventilatory response to hypoxia and breathing pattern in man.** E. S. Petersen and H. Vejby-Christensen (Oxford University, Oxford, England). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, Apr. 1977, p. 492-500. 32 refs. Research supported by the Medical Research Council of Denmark and Medical Research Council of England.

The ventilatory response to hypoxia at each of four levels of Pa-CO2 was studied in five healthy subjects before and after a rise in rectal temperature of 1.4 C had been induced by means of a heated flying suit. At a given level of chemical drive both ventilation and mean inspiratory flow increased after heating, frequency relatively more than tidal volume. In isoventilation comparisons mean inspiratory flow was identical in normo- and hyperthermia, whereas the durations of inspiration and expiration were proportionately shortened. (Author)

A77-32178 **Myocardial Feulgen-DNA levels and capillary vascularization in hypoxia-exposed rats.** A. J. Stere and A. Anthony (Pennsylvania State University, University Park, Pa.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, Apr. 1977, p. 501-507. 26 refs.

Male albino rats were exposed to simulated altitude of 18,000 ft (380 Torr) for 1 day to 8 wk. Histological sections of heart ventricles were stained by the Feulgen technique and amounts of Feulgen-DNA were determined cytophotometrically. Heart weights, relative to body weights, increased over controls at all exposure periods, as did myocardial capillary vascularization. Ninety percent of cardiac muscle nuclei were found to contain tetraploid amounts of DNA. All nuclei exhibited a high degree of chromatin dispersion in exposed and unexposed rats, which reflects a highly reactive metabolic state of cardiac cells in both groups. (Author)

A77-32179 **Effect of acute hypoxia on the hormonal response to exercise.** J. R. Sutton (St. Vincent's Hospital, Sydney, Australia). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, Apr. 1977, p. 587-592. 46 refs.

The hormonal responses to submaximal exercise under normoxic and hypoxic conditions were studied in eight fit males, aged 22-28 yr, with mean maximal oxygen uptake of 4.4 plus or minus 0.7 l/min. Studies were performed in a hypobaric chamber, decompressed to a simulated altitude of 4,550 m. Venous blood samples were obtained at rest, during exercise and for 60 min after exercise. Plasma glucose, free fatty acids, lactate, cortisol, and serum growth hormone concentrations all increased more during hypoxic exercise than under normoxic conditions. Serum insulin concentration showed a small decrease under normoxic conditions, but decreased by 50% during hypoxic exercise, and was followed by marked rebound when exercise-stopped. (Author)

A77-32180 * **Extension of pulmonary O2 tolerance in man at 2 ATA by intermittent O2 exposure.** P. L. Hendricks, D. A. Hall, W. L. Hunter, Jr., and P. J. Haley (U.S. Naval Ocean Systems Center, Submarine Development Group I, San Diego, Calif.; Pennsylvania, University, Medical Center, Philadelphia, Pa.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, Apr. 1977, p. 593-599. 24 refs. Contract No. N0014-0216-26; Grants No. NIH-HL-08899-11; No. NsG-9011.

To study extension of O2 tolerance by interruption of hyperoxic exposure, five healthy volunteers were exposed to oxygen at 2 ATA on an intermittent schedule of 20 min breathing O2, alternating with 5 min on a normoxic N2-O2 mixture. The cycle was repeated until symptoms or signs of O2 toxicity caused cessation of the experiment. Tracheal irritation and burning on inspiration occurred after 6-9 'oxygen hours' of exposure and progressed to severe tracheobronchial burning sensation, chest pain, and dyspnea after 11-15 h of O2. With intermittent O2 administration, nearly a doubling of the average duration of actual oxygen breathing was required to induce marked vital capacity change (more than 10%) as compared to the previous studies of continuous O2 exposure. (Author)

A77-32181 * **Temperature control system for water-perfused suits.** G. L. Brengelmann, M. McKeag, and L. B. Rowell (Washington, University, Seattle, Wash.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, Apr. 1977, p. 656-660. 7 refs. Grants No. NGR-48-002-082; No. NIH-HL-16910; No. NIH-HL-09773; No. NIH-RR-37.

A system used to control skin temperature in human subjects wearing water-perfused garments is described. It supplies 8 l/min at 10 psi with water temperature controlled within plus or minus 0.1 C. Temperature control is facilitated by a low circulating thermal mass and a fast responding heater based on a commercially available quartz heat lamp. The system is open so that hot or cold water can be added from the building mains to produce rates of change of water temperature exceeding 5 C/min. These capabilities allow semiautomatic control of skin temperature within plus or minus 0.1 C of desired wave forms. (Author)

A77-32188 # **Signal detection in psychoacoustics (Obnaruzheniia signala v psikhoakustike).** Iu. A. Indlin (Vsesoiuznyi Nauchno-Issledovatel'skii Kinofotoinstitut, Moscow, USSR). *Akusticheskii Zhurnal*, vol. 23, Jan.-Feb. 1977, p. 50-63. 33 refs. In Russian.

The basic properties of auditory sensation and stimulus, which must be taken into consideration in the formalization of signal detection against a noise background in psychoacoustics, are formulated. It is shown that predictions of an energetic statistical model based on the concept of critical bands and sensor fluctuations correlate well with experimental data not amenable to intepretation within the framework of the theory of ideal observers. The importance of an experimental determination of the relationship between the dispersions of sensor and physical fluctuations to the further development of detection theory is pointed out. V.P.

A77-32205 * **Absolute judgment for one- and two-dimensional stimuli embedded in Gaussian noise.** T. O. Kvalseth (Norwegian Institute of Technology, Trondheim, Norway). *Ergonomics*, vol. 20, Mar. 1977, p. 133-146. 17 refs. NASA-supported research; NSF Grant No. GK-37419.

This study examines the effect on human performance of adding Gaussian noise or disturbance to the stimuli in absolute judgment tasks involving both one- and two-dimensional stimuli. For each selected stimulus value (both an X-value and a Y-value were generated in the two-dimensional case), 10 values (or 10 pairs of values in the two-dimensional case) were generated from a zero-mean Gaussian variate, added to the selected stimulus value and then served as the coordinate values for the 10 points that were displayed sequentially on a CRT. The results show that human performance, in terms of the information transmitted and rms error as functions of stimulus uncertainty, was significantly reduced as the noise variance increased. (Author)

A77-32206 **Interaction of task amplitude with circadian variation in auditory vigilance performance.** J. Mullin and D. W. J. Corcoran (Glasgow, University, Glasgow, Scotland). *Ergonomics*, vol. 20, Mar. 1977, p. 193-200. 16 refs.

Two groups of Ss performed two 1 h auditory vigilance tasks at 08.00 h and 20.00 h. The task comprised a taped sequence of tone bursts of 610 Hz for durations of 0.5 or 0.4 s in a background of low frequency noise on a single loudspeaker. The tones were 5 dB above the noise in all conditions. The shorter tones were defined as signals and occurred randomly at an average rate of 40 per hour. The gain on the tape recorder was set such that for one group the noise level at the ear was 70 dB; for the other group the level was 90 dB. Detection rate improved from morning to evening for the low noise

group but not for the high noise condition. Also vigilance decrement was reduced in the evening with respect to the morning. The results are interpreted as generally supportive of an arousal explanation and their practical importance is considered. (Author)

A77-32352 **Variations of certain ocular system parameters as a function of fatigue resulting from long-haul flights (Variations de certain paramètres du système oculaire en fonction de la fatigue lors des vols long-courriers).** J.-P. Boissin and L. Abbas (Compagnie Nationale Air France, Service Médical du Travail, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 2nd Quarter, 1975, p. 65-67. In French.

Ocular tonus, types of phoria, ophthalmic arterial tension, punctum proximum of convergence and punctum proximum of accommodation, amplitude of fusion in convergence and divergence, and normal nyctohemeral rhythms (response to jet lag) were studied in crew members experiencing two flights of ten hours each nonstop, with 9 hours jet lag in one direction, before and after rest periods. The time involved is found too short to affect ocular tonus. Opthalmic arterial tension is not affected by flight fatigue per se, unless accompanied by a heavy work load or added stress. Variations in the punctum proximum for convergence were observed in some individuals, with some variations in the punctum proximum for accommodation in the case of presbyopic subjects. R.D.V.

A77-32353 **Abnormal hemoglobins capable of inducing pathological manifestations in hypoxia. I (Les hémoglobines anormales susceptibles d'entrainer des manifestations pathologiques en hypoxie. I).** A. E. Vauzelle (Service de Santé des Armées; Service de Santé pour l'Armée de l'Air; Centre de Recherche de Médecine Aéronautique, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 2nd Quarter, 1975, p. 70-77. 168 refs. In French.

Hemoglobin S, associated with sickle-cell anemia, can lead to hazardous low oxygen partial pressures in subjects working at high altitudes (on the ground or in aircraft); the effect of this and other hemoglobinopathies on civil and military aircraft personnel so affected is discussed. The genetic background of drepanocytosis, geographical and ethnic distributions of sickle-cell incidence and endemic malaria (particularly West Africa, Saudi Arabia, and Mediterranean), the structure and properties of hemoglobin S, and oxyhemoglobin saturation in sickle cell carriers are among the topics treated. The literature is reviewed extensively. R.D.V.

A77-32354 **Degradation of human performance brought on by hypoxia - Tests on Nycergoline chemoprotection (Dégradation de la performance humaine provoquée par l'hypoxie - Essais de protection par la Nycergoline).** J. Demange, B. Vettes, J.-L. Poirier, and R. Auffret (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 2nd Quarter, 1975, p. 78-81. In French.

Administration of the drug Nycergoline (favoring enzymatic utilization of oxygen at the level of cerebral nerve cells) to subjects having undergone simulated high-altitude environments, and its effects as chemoprotectant in counteracting degradation of human visual tracking performance, are discussed. The subjects experience one hour low pressure simulating 5000 meters altitude, in a decompression tank, and their responses to random light signals are tested. The medication appears to counteract severe cerebral hypoxia under barometric depression, and restores some of the impaired psychomotor response. Statistical evidence for restoration of response time is judged significant. R.D.V.

A77-32356 **Motivation in light aviation pilots /results of an inquiry carried out on 600 subjects/. I - Nature of the motivation and causes of loss of motivation (La motivation chez les pilotes d'aviation légère /résultats d'une enquête portant sur 600 sujets/. I - Nature de la motivation et causes des pertes de motivation).** G. Verra, J. Martin, J.-P. Crance, and M. Boulangé. *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 2nd Quarter, 1975, p. 85-88. In French.

Results of an inquiry addressed to 1283 pilots belonging to ten aviation clubs in the NE region of France are reported. Questionnaires dealt with motivations early and late in pilot careers, flight-related accidents and illnesses, pilots' views on intensification or reduction of flying activity, and secondary motivations for continuing interest in and practice of aviation. Distributions of subjects by age, flying time logged, and type of pilot are reported. Primary motivations are found highly diverse, while professional and financial considerations affect decisions to reduce or abandon piloting activity. R.D.V.

A77-32357 **Motivation in light aviation pilots /results of an inquiry carried out on 600 subjects/. II - Relationships between motivation and types of aeronautical activity (La motivation chez les pilotes d'aviation légère /résultats d'une enquête portant sur 600 sujets/. II - Relations entre la motivation et les caractères de l'activité aéronautique).** G. Verra, J.-P. Crance, and M. Boulangé. *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 2nd Quarter, 1975, p. 89-92. 6 refs. In French.

Six hundred responses to a questionnaire sent to 1283 pilots are studied for relationships between primary (original) and secondary (reinforcing) motivations. Subjects were classed in 5 groups according to type of piloting activity (motor, glider, practicing instructors, instructors-in-training, aviation club organizers). A steadily intensified interest in actual flying, particularly conspicuous in the case of glider pilots and instructors, is found characteristic of all those continuing a direct interest in flying, irrespective of the level of primary motivation. Lack of such growing interest is accompanied by slackening or abandonment of aviation activity. R.D.V.

A77-32358 **The T.N.O. test and small anomaly angle strabismus cases - Selection of navigation personnel (Le test T.N.O et les strabismes à petit angle d'anomalie - Intérêt dans la sélection du P.N.).** J. P. Chevaleraud (Service de Santé des Armées; Centre Principal d'Expertise Médicale du Personnel Navigant, Service d'Ophtalmologie, Paris, France), C. Brenneisen (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France), and B. Menez (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris; Hôpitaux des Armées, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 2nd Quarter, 1975, p. 93, 94. In French.

The efficacy of the T.N.O. test in detecting subjects suffering from cross-eyed vision with pseudobinocular vision, and angle of anomaly not greater than 8 diopters, is discussed. Such subjects, with visual defects and cosmetic appearance corrected spontaneously or via optical, orthoptical, or surgical treatment, are often capable of passing the WIRT test and being qualified as navigation personnel. The T.N.O. test, using anaglyphic stereograms in complementary colors, with images formed by computer techniques, detects such subjects from the outset. R.D.V.

A77-32360 **Accepting passengers afflicted with communicable diseases on passenger airlines (Le transport des malades contagieux en avion de ligne).** M. Perin (Compagnie Nationale Air France, Service Médical Central, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 2nd Quarter, 1975, p. 99-105. 22 refs. In French.

The futility of attempts by airlines to avert contagion by refusing passage to some subjects afflicted with contagious diseases or manifesting discharges upsetting to other passengers, the relativity of contagion hazard, and the moral and social aspects of legislation permitting airlines to refuse service to suspected passengers are scrutinized. The advisability of airlines performing public health functions, even if authorized by legislation, is examined. Socially undesirable effects of refusal of carrier service, psychological effects of obviously ill passengers on other passengers and crew, the greater danger posed by undiagnosed cases, and the imperative need to transport some patients and not to leave ill passengers stranded, are discussed. R.D.V.

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A77-32361 **On the selection of pilots for high-speed aircraft (A propos de la sélection des pilotes d'avions rapides).** J. Chevaleraud and G. Perdriel (Centre Principal d'Expersise Médicale du Personnel Navigant, Service d'Ophtalmologie, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 2nd Quarter, 1975, p. 106-108. In French.

Ophthalmological tests and disqualification criteria for prospective pilots of high-speed aircraft are discussed. Measurements of monocular visual acuity, oculomotor equilibrium, stereoscopic parallax, night vision and recovery of night vision after dazzling with light, and color discrimination are discussed. Results of qualification tests over the years 1966-1974 for police motorcycle patrol service are cited. R.D.V.

A77-32362 **Drepanocytosis and flight personnel (Trait drépanocytaire et personnel navigant).** P. Fourn (Union de Transports Aériens, Service Médical, Paris, France; Air Afrique, Abidjan, Ivory Coast) and M. Gentilini (Groupe Hospitalier Pitié-Solpétrière, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 129-133. 5 refs. In French.

The paper examines the attitude of aerospace medicine to the problem of drepanocytosis afflicting flight personnel. The problem is discussed in relation to hypoxia, loss of pressurization, cold, overheating, tobacco smoke in the cockpit, stress of takeoff and landing, night-flight fatigue, irregular hours and climatic variations. B.J.

A77-32363 **Role of small mass in the interpretation of maximum oxygen consumption (Rôle de la masse maigre dans l'interprétation de la consommation maximale d'oxygène).** J. Fabre, B. Rousseau, and J. L. Hauttement (Caen, Université, Caen, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 134-136. In French.

A total of 439 students were tested to determine the correlation between maximum oxygen consumption, weight, and small mass. A statistical analysis revealed that there are significant differences between men and women and between athletes and nonathletes. VO2 Max. estimation is a good evaluation of physical aptitude and there is a significant link between VO2 Max. weight, figure, small mass, and body surface. B.J.

A77-32364 **Arterial hypertension, anti-hypertensive drugs and flight personnel (Hypertension artérielle, medicaments anti-hypertenseurs et personnel navigant).** D. Fritel (Paris, Université, Paris; Hôpital Ambroise Paré, Boulogne-sur-Seine, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 137-139. 6 refs. In French.

It is noted that arterial hypertension and the drugs used to treat it both serve to detract from the flight fitness of flight personnel. It seems that the limiting cases of arterial hypertension, labile hypertension in particular, can be treated by diuretics without affecting flight fitness. B.J.

A77-32365 **Thyroid pathology in aviation flight personnel (La pathologie thyroidienne dans le personnel navigant de l'aéronautique).** A. Didier, F. Jorry, R. Carre, and J. Bastien (Centre Principal d'Expertise Médicale du Personnel Navigant de l'Aéronautique, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 140-145. 15 refs. In French.

It would seem theoretically that the Basedow sickness and the hyperthyroid condition should be frequent among flight personnel due to the physical and psychological stresses to which they are subjected. A study conducted among two groups of flight personnel, both males and females, reveals, however, that thyroid pathology is comparatively rare among flight personnel. B.J.

A77-32366 **Concerning 46 cases of myocardial infarction among passengers (A propos de 46 cas d'infarctus du myocarde chez des passagers).** J. L. Arnaudin. *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 146-149. In French.

An increase in the number of passengers suffering from myocardial infarction has been reported by the first aid services of Aeroport de Paris during 1971-1974. The first clinical manifestations of the attacks tend to occur at the end of the flight, during approach, landing and even after disembarking. Attention is given to ways of preventing such attacks. B.J.

A77-32367 **Study of the variability of heart rhythm during a piloting task on helicopter (Etude de la variabilité du rythme cardiaque au cours d'une tâche de pilotage sur hélicoptère).** B. Vettes, J. Demange (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France), and R. Auffret (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne; Service de Santé des Armées, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 150-158. 7 refs. In French.

Four tests pilots, whose ages ranged from 35 to 50, completed five different tasks all involving landing a helicopter in the context of an instrument landing system. Recording of heart rhythm during these tasks showed a general increase in heart rate, and a slight decrease in this increase when a given task was repeated. B.J.

A77-32368 **Diabetes and flight personnel (Diabète et personnel navigant).** F. Jorry, A. Didier, R. Carre, and J. Bastien (Centre Principal d'Expertise Médicale du Personnel Navigant de l'Aéronautique, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 159-163. 10 refs. In French.

An attitude is developed concerning the fitness of diabetics to work as flight personnel. This attitude, which takes account of the type of diabetes and the therapeutic needs, aims to preserve the talents and defend the interests of the individual involved without prejudicing flight safety. B.J.

A77-32369 **The release of mobilization polycythemia (Sur le déclenchement de la polycythémie de mobilisation).** M. V. Strumza, J. M. Strumza Poutonnet, and D. Andre (Paris V, Université, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 164-168. 9 refs. In French.

In a flight environment, the response to physical and psychological stresses leads to losses of energy, and then to the introduction of mechanisms for covering these energy losses. One of these mechanisms is the release of acute polycythemia of mobilization, which increases the amount of oxygen available at the cell level. The release of this type of acute polycythemia is studied using dog subjects in conditions of acute hypoxic hypoxia. B.J.

A77-32370 **Output-volume loops in respiratory functional exploration (Intérêt des boucles débit-volume en exploration fonctionnelle respiratoire).** J. Droniou, G. Leguay, and J. Pernod (Hôpital d'Instruction des Armées Percy, Clamart, Hauts-de-Seine, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 14, 3rd and 4th Quarter, 1975, p. 169-174. 6 refs. In French.

Three hundred subjects - including subjects with heart diseases and chronic bronchial diseases along with healthy subjects - were tested to determine their output-volume curves during forced expiration. The mechanism of the limitation of maximum expired output at low lung volumes was determined, taking account of outputs at 50 per cent and 25 per cent of vital capacity, and the connection between output at 25 per cent vital capacity with distal bronchial resistance. B.J.

A77-32372 **Fractures of the spine in flight - The role of Gz/plus/ accelerations - Concerning two recent observations (Les fractures du rachis en vol - Rôle des accélérations Gz/plus/ - A propos de 2 observations récentes).** J. P. Parsal, G. Jacob (Armée de l'Air, Service Médical, Cazaux, Gironde, France), R. P. Delahaye (Hôpital d'Instruction des Armées Begin, Saint Mandé, Val-de-Marne, France), R. Auffret (Centre d'Essais en Vol, Brétigny-sur-Orge Essonne, France), and A. Salvagniac (Service de Santé pour l'Armée de l'Air,

Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 3rd and 4th Quarter, 1975, p. 179-183. 14 refs. In French.

Fractures of the spine suffered by two military pilots due to Gz(plus) accelerations of variable duration and rather high amplitude are reported on. One pilot fractured his spine due to the unbolting of his seat in a sharp turn. The other pilot fractured his spine during a missile firing exercise while performing a relatively violent pull-out at about 6 G. B.J.

A77-32373 **Abnormal hemoglobins that may produce pathological manifestations in hypoxia. II (Les hémoglobines anormales susceptibles d'entrainer des manifestations pathologiques en hypoxie. II).** A. E. Vauzelle. *Revue de Médecine Aéronautique et Spatiale*, vol. 14, 3rd and 4th Quarter, 1975, p. 184-193. 171 refs. In French.

Attention is given to the relation between hypoxia and sickle cell hemoglobin. External factors increasing the risk of a drepanocytosis crisis are considered including physical effort and emotional factors. Means for the treatment and prevention of drepanocytosis are discussed. A comprehensive bibliography is provided. B.J.

A77-32397 **The echocardiophone - A new means for observing spatial movement of the heart.** L. Kay, J. Boys, G. Clark, and J. Mason (Canterbury, University, Christchurch, New Zealand). *Ultrasonics*, vol. 15, May 1977, p. 136-141. 5 refs.

The paper describes a new pocket size instrument called the 'Cardiophone' for the diagnosis of cardiac dysfunction. It is a continuous wave swept frequency ultrasonic echo-location system which produces dynamic auditory signals corresponding to the positional change of internal structures of the heart. The four valves are relatively easy to locate compared with conventional ECG machines. Preliminary clinical evaluation results are presented indicating the potential of the instrument for the general practitioner. (Author)

A77-32400 # **Training of the vestibular analyzer and ways of evaluating its efficacy (Trenirovka vestibuliarnogo analizatora i metody otsenki ee effektivnosti).** I. A. Sidel'nikov and S. S. Markarian. *Voenno-Meditsinskii Zhurnal*, Jan. 1977, p. 66-70. In Russian.

A new procedure for recovery and enhancement of vestibular stability in air cadets (before maiden flights) and in crew members (on the basis of readings) is presented. Cases where the vestibular analyzer is acted upon by an intense load or after a prolonged interval are also considered. Continuous and discontinuous buildup of Coriolis accelerations and effects of frontal and sagittal buildup of Coriolis accelerations, and combinations of several modes of acceleration, are discussed, with attention given to vestibulo-vegetative disturbances. Active training and mixed training of the vestibular analyzer, with motions of the rotating chair and subject's head involved, are discussed. R.D.V.

A77-32451 * **Studies in interactive communication. II - The effects of four communication modes on the linguistic performance of teams during cooperative problem solving.** A. Chapanis, R. N. Parrish, R. B. Ochsman, and G. D. Weeks (Johns Hopkins University, Baltimore, Md.). *Human Factors*, vol. 19, Apr. 1977, p. 101-126. 8 refs. NSF Grants No. GN-890; No. GN-35023; No. APR-75-18622; Grant No. NGR-21-001-073.

Two-man teams solved credible, 'real world' problems for which computer assistance has been or could be useful. Conversations were carried on in one of four modes of communication: typewriting, handwriting, voice, and natural unrestricted communication. Performance was assessed on three classes of dependent measures: time to solution, behavioral measures of activity, and linguistic measures. Significant differences among the communication modes were found in each of the three classes. This paper is concerned mainly with the results of the linguistic analyses. Linguistic performance was assessed with 182 measures, most of which turned out to be redundant and some of which were useless or meaningless. Those that remain show that although problems can be solved faster in the oral modes than in the hard-copy modes, the oral modes are characterized by many more messages, sentences, words, and unique words; much higher communication rates; but lower type-token ratios. Although a number of significant problem and job-role effects were found, there were relatively few significant interactions of modes with these variables. It appears, therefore, that the mode effects hold for both problems and for both job roles assigned to the subjects. (Author)

A77-32468 # **Theoretical aspects of some sensory-acoustical and bio-acoustical experiments.** E. Rajcan (Vysoka Skola Lesnicka a Drevarska, Zvolen, Czechoslovakia). *Acta Physica Slovaca*, vol. 27, no. 2, 1977, p. 149-158. 22 refs.

The problems of the theoretical interpretation of the experimental results from the point of view of the place principle and the time course principle of the theory of hearing are shown. The corrective conception of the theory of hearing is formulated. This conception enables the simple interpretation of the known experimental results. (Author)

A77-32600 **Role of P-CO2 oscillations and chemoreceptors in ventilatory response to inhaled and infused CO2.** R. A. F. Linton, R. Miller, and I. R. Cameron (St. Thomas's Hospital, London, England). *Respiration Physiology*, vol. 29, Apr. 1977, p. 201-210. 16 refs.

It was previously shown in the anaesthetized rabbit that the ventilatory response to an increase in Pa-CO2 is greater if that increase is produced by intravenous infusion of hypercapnic blood than by inhalation of CO2. The present set of experiments was designed to investigate the reason for this. It was found that the difference in ventilatory response observed in the intact rabbit was abolished by cutting the carotid sinus nerves or by eliminating the pH/Pa-CO2 oscillations in the carotid blood flow. It is concluded that the normally greater ventilatory response to intravenous infusion of hypercapnic blood compared with inhalation of CO2 is due to a respiratory signal derived from Pa-CO2 oscillations and carried in the carotid sinus nerves. (Author)

A77-32866 # **Active processes on the sun and in the biosphere (Aktivnye protsessy na solntse i biosfera).** B. M. Vladimirskii (Krymskaia Astrofizicheskaia Observatoriia, Nauchny, Ukrainian SSR). *(Mezhdunarodnyi Seminar po Aktivnym Protsessam na Solntse i Probleme Solnechnykh Neitrino, 8th, Leningrad, USSR, Sept. 25-27, 1976.) Akademiia Nauk SSSR, Izvestiia, Seriia Fizicheskaia*, vol. 41, Feb. 1977, p. 403-410. 51 refs. In Russian.

The following mechanism for the effects of solar activity on biological phenomena is formulated: solar disturbance (e.g., an intense chromospheric flare), disturbance of the magnetosphere and plasmasphere (a magnetic storm with sudden commencement), changes in the strength and spectrum of the background electromagnetic field on the earth surface and changes in the physiological indices of the organism. The effects of such parameters of the environment as cosmic rays and the geomagnetic field on the organism are also discussed. B.J.

A77-32879 # **Bioelectric control of human movements (Bioelektrichne keruvannia rukhami liudini).** S. G. Bunin (Akademiia Nauk Ukrains'koi RSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Avtomatika*, Jan.-Feb. 1977, p. 46-50. 5 refs. In Ukrainian.

Theoretical considerations are presented on the control of human movements by the electrical stimulation of the neuromuscular system. Proportional control is obtained by the analysis of three transfer functions, representing the methods for signal extraction and transmission and also signal conversion in the control apparatus. B.J.

A77-32970 # **Effect of aircraft noise on the human organism (Vozdeistvie aviatsionnogo shuma na organizm cheloveka).** Iu. V. Krylov, N. I. Frolov, V. S. Kuznetsov, and V. Ia. Koliagin. *Voenno-Meditsinskii Zhurnal*, Feb. 1977, p. 57-59. In Russian.

Twenty-seven healthy males, ages 25 to 40 years, were subjected to simulated aircraft noise for 48 hours; the sound pressure level at the ear varied in the range 80-90 dB. It was found that the noise led to a sharp increase of the noise auditory thresholds, a disruption of the circadian rhythm, a delay in the rate of reaction to sound and light, a reduction in excitability, and an increase in the labileness of the auditory analyzer. B.J.

A77-32971 # **Physiological changes in the pilots of ship helicopters (K voprosu o fiziologicheskikh sdvigakh u letchikov palubnykh vertoletov).** V. I. Kuleshov. *Voenno-Meditsinskii Zhurnal*, Feb. 1977, p. 60-62. In Russian.

Two flight crews of ship helicopters were tested for pulse at rest, arterial pressure, maximum muscular exertion, and static muscular endurance during hydrodynamometry, and critical flicker fusion frequency. The results of the investigation reveal a definite development of fatigue among the flight crews during training flights. B.J.

A77-32972 # **Tolerance of pilots with ulcers to moderate degrees of hypoxia (Perenosimost' umerennykh stepenei gipoksii letchikami, stradaiushchimi iazvennoi bolezn'iu).** V. D. Vlasov and S. F. Raev. *Voenno-Meditsinskii Zhurnal*, Feb. 1977, p. 62, 63. In Russian.

A77-32996 # **How the brain organizes the fast responses of the cardiovascular system (Kak mozg organizuet bystrye reaktsii serdechno-sosudistoi sistemy).** V. M. Khaiutin, E. V. Lukoshkova, and Iu. B. Gailans (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Feb. 1977, p. 277-285. 17 refs. In Russian.

Cerebral regulation of the fast responses of the cardiovascular system is examined. Particular attention is given to the organization of the command of the sympathetic nervous system in order for the heart and vessels to pass, as fast as possible, from a steady state to a more active state without being subjected to overcontrol. Different phases of this command for fast action during excitation of the sympathetic nervous system are analyzed. S.D.

A77-32997 # **Sensitivity to adrenocorticotropin during adaptation to increased muscular activity (Chuvstvitel'nost' k adrenokortiko-tropnomu gormonu pri adaptatsii k povyshennoi myshechnoi deiatel'nosti).** N. N. Iakovlev (Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Feb. 1977, p. 320-323. 17 refs. In Russian.

A77-32998 # **Effect of lesion of the medial eminence of thermoregulation (Vliianie razrusheniia medial'noi eminentsii na termoreguliatsiiu).** E. M. Stabrovskii and L. S. Shpanskaia (Institut Usovershenstvovaniia Vrachei, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Feb. 1977, p. 324-330. 18 refs. In Russian.

In male rats weighing 180-240 g, changes in general thermoregulation and in functional activity of the suprarenal cortex, thyroid gland, and enterochromaffine system were studied after electrolytic lesion of the hypothalamic medial eminence. Under thermoneutral conditions, functions of the suprarenal cortex and thyroid gland remained unchanged while the activity of the enterochromaffine system was reduced. Cooling decreased abruptly the reaction of thermoregulation and the functional activity of the endocrine glands. The data suggest that the neurosecretory granules of the hypothalamic medial eminence participate in regulating the thermal homeostasis in rats. (Author)

A77-32999 # **The physiological significance of exercise hyperthermia (O fiziologicheskom znachenii rabochei gipertermii).** S. V. Rodchenkov (Institute for Medical Biological Problems, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Feb. 1977, p. 331-336. 15 refs. In Russian.

The colonic temperature and heart rate were recorded in rats on the treadmill running at 12 and 24 m/min at an ambient temperature of about 24 deg. A linear dependence of these quantities on physical load intensity was observed. For rats who had different body temperatures at the beginning of exercise, the absolute values of the colonic temperature during running differed little. The moment at which the temperature curve reaches a plateau, from which one may infer the activation of heat exchange processes, also depends on running rate. It is concluded that increase of the colonic temperature of rats under physical load is a regulated reaction. P.T.H.

A77-33000 # **Chemical thermoregulation and muscular thermogenesis during high-altitude adaptation (Khimicheskaia termoreguliatsiia i myshechnyi termogenez pri adaptatsii k vysokogor'iu).** Iu. I. Bazhenov and A. Soodanbekova (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Feb. 1977, p. 337-341. 24 refs. In Russian.

The effect of long-term adaptation to high-altitude (3200 m) on the thermoregulatory heat production and muscular thermogenesis in white rats was studied. Information was obtained on the effect of high-altitude adaptation on the thermoregulatory significance of red and white muscle fibers. In high-altitude adapted rats, oxygen consumption per unit muscular contraction was reduced. It is suggested that the lowering of the thermoregulatory efficiency of muscular contractions is linked with a reduction of the thermogenic function of the red muscle fibers. It is concluded that high-altitude adaptation decreased the heat yield per unit muscular contraction, which may be a reason for the decreased body temperature during oxygen deficiency. P.T.H.

A77-33120 **Growth of Klebsiella aerogenes on xylitol - Implications for bacterial enzyme evolution.** C. B. Inderlied and R. P. Mortlock (Massachusetts, University, Amherst, Mass.). *Journal of Molecular Evolution*, vol. 9, Apr. 29, 1977, p. 181-190. 18 refs. Grant No. PHS-A1-06848.

When Klebsiella aerogenes was grown in continuous culture with xylitol, an unnatural pentitol, as the growth limiting substrate, the structural gene which codes for ribitol dehydrogenase, an enzyme which gratuitously catalyzes the oxidation of xylitol to D-xylulose, was duplicated. It appears that the duplication mechanism only duplicates the gene which is subjected to selective pressure and not any of the other closely linked genes. The degree to which the ribitol dehydrogenase gene is duplicated does not appear to be strictly correlated with the ability to grow faster on xylitol. Duplication mutants grow faster than their parent strain, but when challenged to grow at even higher growth rates there is a catabolic repression of enzyme activity. A situation is created in which a structural gene is duplicated in response to selective pressure. These mutants can grow faster on the new substrate, but faster growth results in a 'silencing' of a portion of the genes by catabolite repression. (Author)

A77-33216 # **Parametric optimization in the problem of two-legged walking (Parametricheskaia optimizatsiia v zadache dvunogoi khod'by).** V. V. Beletskii and P. S. Chudinov. *Akademiia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela*, Jan.-Feb. 1977, p. 25-35. 7 refs. In Russian.

A semi-inverse method is used to analyze the dynamics of a two-legged walking machine. Part of the generalized coordinates is given in the form of explicit functions of time, while the remainder of the kinematic and dynamic variables is determined from the nonlinear differential equations of motion. Some problems of walking are submitted to parametric optimization, as a result of which optimal machine configurations, minimizing energy consumption, are determined. B.J.

A77-33274 **Aortic origin of innocent murmurs.** P. D. Stein and H. N. Sabbah (Henry Ford Hospital, Detroit, Mich.). *American Journal of Cardiology*, vol. 39, May 4, 1977, p. 665-671. 20 refs.

Ten patients with no clinical evidence of valvular heart disease were studied during diagnostic cardiac catheterization performed because of symptoms of angina pectoris. Six had no audible murmurs at rest, and four had grade 1 to 2/6 short systolic murmurs heard along the left sternal border. None had a pressure gradient measured across the aortic or pulmonary valve and none had ventriculographic evidence of mitral regurgitation. Pressure and sound in all patients were measured simultaneously, first in the aorta, then in the pulmonary artery with a catheter-tip micromanometer. Comparable observations were made in six mongrel dogs. The results suggest that innocent murmurs originate in the region of the aortic rather than the pulmonary valve, probably due to the greater compliance of the pulmonary artery with a damping effect on turbulence. S.D.

A77-33275 **New practical treadmill protocol for clinical use.** R. A. Wolthuis, V. F. Froelicher, Jr., J. Fischer, I. Noguera, G. Davis, A. J. Stewart, and J. H. Triebwasser (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *American Journal of Cardiology*, vol. 39, May 4, 1977, p. 697-700. 6 refs.

The paper outlines the procedure and capabilities of a new and most practical treadmill protocol for routine clinical stress testing, which continues the design advantages of the older Balke-Ware protocol, uses the same normal reference values, and offers a significant reduction in time to maximal effort. Emphasis is placed on an evaluation of this new protocol, including a direct comparison with the Balke-Ware protocol in a carefully controlled laboratory study conducted on 26 healthy men selected on the basis of health status, age, height, weight, and activity habits. Preliminary results are also presented for the application of the protocol to both asymptomatic and symptomatic clinical populations. The advantages and practicality of the protocol are demonstrated. The single measurement showing a consistent between-protocol difference, compared to the Balke-Ware protocol, is the maximal treadmill time. S.D.

A77-33285 **Clinical value of quantitative analysis of ST slope during exercise.** C. A. Ascoop, C. A. Distelbrink, and P. A. De Lang (St. Antonius Hospital; Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Medisch-Fysisch Instituut TNO, Utrecht, Netherlands). *British Heart Journal*, vol. 39, Feb. 1977, p. 212-217. 19 refs.

Experiments were conducted on 147 male patients suspected of having ischemic heart disease in order to assess various new criteria in exercice electrocardiography. The learning population consisted of 87 patients aged 39-53 yr, while the testing population comprised 60 patients aged 42-58-yr. The QRS-T wave analysis was performed with the aid of a digital computer. The exercise-induced ECG changes in each patient were compared with the findings from coronary angiography. The parameters measured were ST depressions, ST slopes, and SX integral as the surface area between baseline and the negative part of the ST segment from junction to point X as the first intersection between baseline and ST segment. It is shown that by automatic analysis, diagnostic results are considerably better than by visual analysis if new criteria based on ST slope, ST depression, and SX integral are used for male patients in whom the resting (sitting) repolarization wave is normal. S.D.

A77-33320 **Aerospace Medical Association, Annual Scientific Meeting, 48th, Las Vegas, Nev., May 9-12, 1977, Preprints.** Washington, D.C., Aerospace Medical Association, 1977. 271 p. Members, $10.00; nonmembers, $15.

Relevant physiological problems related to human performance in flight vehicles and under various stressful conditions are examined. Particular attention is given to heat and cold acclimation, hyperbaric environment effects, cardiopulmonary resuscitation, accident investigation, and analysis of visual and vestibular functions. Other areas of interest comprise toxicology, head injury, altitude protection, undersea medicine, anthropometry, noise and vibration, and cardiovascular deconditioning during bedrest. S.D.

A77-33574 **Coronary heart disease: Clinical, angiographic, and pathologic profiles.** Z. Vlodaver (United Hospitals, St. Paul, Minn.), K. Amplatz (Minnesota, University, Hospitals, Minneapolis, Minn.), H. B. Burchell (Minnesota, University; Northwestern Hospital, Minneapolis, Minn.), and J. E. Edwards (United Hospitals, St. Paul; Minnesota, University, Minneapolis, Minn.). New York and Berlin, Springer-Verlag, 1976. 596 p. 67 refs. $69.80.

The work provides a comprehensive picture of the complexities of ischemic heart disease as related to clinical cardiology, radiology, thoracic surgery, and pathology. Specific chapters deal with variations in the sites of origin and distribution of coronary arteries, both as seen angiographically and anatomically. Congenital anomalies of the coronary arteries which may result in various states of ischemic heart disease are presented. Other subjects include angina pectoris, acute myocardial infarction, pathology of obstructive coronary disease, and surgical revascularization. S.D.

1 7 0 A G 7 7 UMI

STAR ENTRIES

N77-22794* National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
APPLICATION OF LUCIFERASE ASSAY FOR ATP TO ANTIMICROBIAL DRUG SUSCEPTIBILITY Patent
Emmett W. Chappelle, Grace L. Picciolo, Hillar Vellend (New England Medical Center, Boston), Stephanie A. Tuttle (New England Medical Center, Boston), Michael J. Barza (New England Medical Center, Boston), and Louis Weinstein, inventors (to NASA) (New England Medical Center, Boston) Issued 29 Mar. 1977 10 p Filed 30 Apr. 1975 Supersedes N75-26629 (13 - 17, p 2155)
(NASA-Case-GSC-12039-1; US-Patent-4,014,745; US-Patent-Appl-SN-572991; US-Patent-Class-195-103.5K; US-Patent-Class-195-103.5R) Avail: US Patent Office CSCL 06C

The susceptibility of bacteria, particularly those derived from body fluids, to antimicrobial agents is determined in terms of an ATP index measured by culturing a bacterium in a growth medium. The amount of ATP is assayed in a sample of the cultured bacterium by measuring the amount of luminescent light emitted when the bacterial ATP is reacted with a luciferase-luciferin mixture. The sample of the cultured bacterium is subjected to an antibiotic agent. The amount of bacterial adenosine triphosphate is assayed after treatment with the antibiotic by measuring the luminescent light resulting from the reaction. The ATP index is determined from the values obtained from the assay procedures. Official Gazette of the U.S. Patent Office

N77-22795*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
THE ANOMALY DATA BASE OF SCREWWORM INFORMATION
L. E. Giddings Oct. 1976 688 p refs
(Contract NAS9-12200)
(NASA-CR-151333; LEC-7922) Avail: NTIS HC A99/MF A01 CSCL 06C

Standard statistical processing of anomaly data in the screwworm eradication data system is possible from data compiled on magnetic tapes with the Univac 1108 computer. The format and organization of the data in the data base, which is also available on dedicated disc storage, are described. Author

N77-22796# Arizona Univ., Tucson. Dept. of Chemistry.
FREE RADICALS IN BIOLOGICAL ENERGY CONVERSION: EPR STUDIES OF MODEL SYSTEMS Final Report
G. Tollin 31 Aug. 1976 20 p refs
(Contract E(11-1)-908)
(COO-908-50) Avail: NTIS HC A02/MF A01

The molecular-electronic mechanism of chlorophyll participation in photosynthesis was elucidated. The following reactions were observed: (1) Photoproduction of C(+) (chlorophyll cation radical) in solution in the absence of added electron acceptors. This is a low quantum yield reaction which proceeds via the lowest excited singlet state. Bacteriochlorophyll also undergoes this reaction, whereas pheophytin does not. (2) One-electron phototransfer between the chlorophyll lowest triplet state and quinones to yield a radical pair (C(+) - Q(+) (quinone radical). This may either recombine or separate. The C(+) formed upon separation is unstable and reacts with hydroxylic compounds to regenerate chlorophyll. The Q(-) species partly reacts with oxidized solvent and partly disproportionates. Both bacteriochlorophyll and pheophytin are also able to react with quinones in this manner. The quenching of the chlorophyll lowest singlet state by quinones does not, however, lead to detectable radical formation. These reactions seem to provide acceptable models for certain aspects of photosynthetic energy conversion, and thus elucidation of their detailed mechanisms should lead to useful insights into the nature of the biological process. ERA

N77-22797# Bureau of Radiological Health, Rockville, Md.
SYMPOSIUM ON BIOLOGICAL EFFECTS AND MEASUREMENT OF LIGHT SOURCES
DeWitt G. Hazzard Oct. 1976 252 p Conf held at Rockville, Md., 25-26 Mar., 1976 Sponsored by HEW
(PB-261167/1; FDA/BRH-77/11; DHEW/PUBL/FDA-77/8002) Avail: NTIS HC A12/MF A01 CSCL 06R

Presentations and subsequent discussions cover subject areas such as physiological and ocular responses to light, effects of light on biochemical and cellular response in bacterial and mammalian cell systems and measurement of coherent and noncoherent light sources. GRA

N77-22798# School of Aerospace Medicine, Brooks AFB, Tex.
THERMAL RESPONSES TO HIGH-FREQUENCY ELECTROMAGNETIC RADIATION FIELDS Interim Report, 1 Jul. - 1 Sep. 1975
James W. Frazier, James H. Merritt, Stewart J. Allen, Richard H. Hartzell, and James A. Ratliff Sep. 1976 20 p refs
(AD-A032179; SAM-TR-76-20) Avail: NTIS HC A02/MF A01 CSCL 06/18

Monkeys were exposed to fields of 1000, 750, and 500 mW/sq cm. at 26 MHz in a coaxial transmission line for 6 hours. An immediate rise in skin and rectal temperature, with subsequent cooling, was noted. Rectal temperature reached an equilibrium after about 1.5 hours of exposure. This equilibrium was maintained throughout the remainder of the explosure period. Thermoregulatory mechanisms activated as a result of exposure to even the highest power (1000 mW/sq cm.) appear adequate to dissipate the imposed heat load. Author (GRA)

N77-22799# Indianapolis Center for Advanced Research, Ind.
THERAPEUTIC AND DIAGNOSTIC CAPABILITIES OF ULTRASOUND IN ISCHEMIC AND INFARCTED MYOCARDIUM Annual Report, 30 Jun. 1975 - 15 Apr. 1976
Thomas D. Franklin, Jr. Apr. 1976 20 p
(Contract HV-4-3004)
(PB-262085/4; NIH-N01-HV-53004-A76) Avail: NTIS HC A02/MF A01 CSCL 06E

The effect of low intensity ultrasonic therapy on infarcted myocardium in the dog was evaluated. Degrees of collagen formation, vascularity, and perivascular sparing in the infarcted region were analyzed. Forty dogs were acutely infarcted via coronary artery ligation and treated for a six week period with either ultrasonic therapy or placebo massage. Gross infarct mapping using enzyme specific staining techniques was carried out. Histological verification of the infarctions was made and a pathological evaluation completed. A decrease in the dense collagen content of the infarcted areas treated with ultrasound was a qualitative finding, and a larger number of viable myocardial islands was also noted. GRA

N77-22800# Washington Univ., Seattle. Dept. of Psychology.
CHANGES IN BEHAVIOR FOLLOWING CHANGES IN CONTROL OVER OUTCOMES: A THEORY BASED ON RESPONSES TO UNCERTAINTY

James R. Larson, Jr. and Terence R. Mitchell. Sep. 1976 116 p refs
(Contract N00014-76-C-0193)
(AD-A033562; TR-76-3) Avail: NTIS HC A06/MF A01 CSCL 05/10

A theory to predict outcome-oriented effort following changes in control over outcomes is proposed. This theory is based on a hypothesized motivation to avoid uncertainty. As uncertainty about control increases, individuals should become increasingly motivated to seek uncertainty-reducing information. They should thus become increasingly motivated to exert outcome-oriented effort in an attempt to provide more information about the consequences of their behavior. Changes are seen as a function of one's uncertainty about control both before and after the change in control. The relationship between this theory and several other psychological theories is discussed. Author (GRA)

N77-22801# Decisions and Designs, Inc., McLean, Va.
ASSESSMENT OF GROUP PREFERENCES AND GROUP UNCERTAINTY FOR DECISION MAKING Technical Report, Jul. 1975 - Sep. 1976
David A. Seaver. Jun. 1976 68 p refs Prepared by Univ. of Southern Calif., Los Angeles
(Contract N00014-76-C-0074; ARPA Order 3052)
(AD-A033246; SSRI-76-4) Avail: NTIS HC A04/MF A01 CSCL 05/10

Often groups rather than individuals function as decision makers. To use decision analysis to aid such decision makers, group preferences and opinions must be quantified as utilities and probabilities. This paper reviews the procedures by which these group utilities and probabilities can be determined, along with the relative merits of individual versus group judgments of these quantities. While group judgments are generally superior to individual judgments, no entirely satisfactory method for determining either group utilities or probabilities exists. Using ordinal preferences rather than cardinal utilities, majority rule will lead to a satisfactory group preference function in certain restricted situations. Both mathematical aggregation rules and behavioral approaches have been suggested for obtaining group probabilities. The mathematical approaches range from the simple to complex. The theoretically elegant methods, however, generally suffer in practice from the impossibility of determining some of the inputs necessary for the models. The behavioral approaches attempt to reduce disagreement by communication and interaction among the group members. The most successful methods depend on structural communication to allow the facilitation of group judgments while avoiding many of the detrimental influences that have been identified in social psychological research. GRA

N77-22802# Calspan Corp., Buffalo, N.Y.
AUTOMOBILE CONSUMER INFORMATION CRASH TEST PROGRAM, VOLUME 2 Final Technical Report, Jun. 1974 - Jan. 1976
N. E. Shoemaker, M. O. Ryder, and N. J. Deleys. Nov. 1976 270 p refs
(Contract DOT-HS-4-00910)
(PB-262411/2; CALSPAN-ZT-5561-V-29-Vol-2; DOT-HS-802011-A) Avail: NTIS HC A12/MF A01 CSCL 13F

The full-scale crash testing program included frontal barrier and car to car front-to-side and front-to-rear impacts in 22 test vehicles. The vehicle structure and occupant computer models are briefly described, and comparisons of simulated and actual crash test results are presented. The methodology and results of static crush tests that were performed to obtain data on the force-deflection properties of the major vehicle structural components for input to the vehicle response models are also presented. GRA

N77-22803# Transportation Research Board, Washington, D.C.
DESIGN FOR CRASH SURVIVAL OF AUTOMOBILE OCCUPANTS
1976 66 p refs Presented at the 54th Ann. Meeting of the Transportation Res. Board.
(PB-261194/5; TRB/TRR-586; ISBN-0-309-02550-8) Avail: NTIS HC A04/MF A01 CSCL 13L

The crash environment, human injury mechanisms and impact tolerance, and subcompact car crashworthiness were studied. Impact performance and an evaluation criterion for median barriers and automobile-attenuator compatibility in 1985-some designer guidelines were the other topics considered. GRA

N77-22804# Virginia Univ., Charlottesville. Dept. of Chemical Engineering.
ENZYME APPLICATIONS IN THE VAPOR PHASE AND ON ELECTRICALLY CONDUCTING SURFACES Final Report
Donald J. Kirwan. Oct. 1976 30 p refs
(Grant NSF APR-72-03442-A04)
(PB-261710/8; UVA/526119/CHE76/101; NSF/RA-760312) Avail: NTIS HC A03/MF A01 CSCL 06I

This program is concerned with two applied projects: an electrochemical method of water disinfection and air disinfection using a filter with immobilized hydrolytic enzymes. The general objectives include: (1) research and development of an electrochemical device for destruction of water-borne pathogens such as bacteria and virus; (2) an investigation of immobilized enzymes for disinfection of air and water; (3) characterizations of immobilized enzymes operating in an aerosol or a continuous liquid phase environment; (4) a study of the use of electrosorption as a biological separation process; (5) research on immobilized whole cell reactors for nitrogen fixation; and (6) an investigation of the interactions of whole cells and electrodes to develop a new method for detection of viable organisms, viruses, and antibiotics. GRA

N77-22805# Army Aeromedical Research Lab., Fort Rucker, Ala.
IN-FLIGHT PERFORMANCE WITH NIGHT VISION GOGGLES DURING REDUCED ILLUMINATION Final Report
Michael A. Lees, David D. Glick, Kent A. Kimball, and Allen C. Snow, Jr. Aug. 1976 39 p refs
(AD-A031991; USAARL-76-27) Avail: NTIS HC A03/MF A01 CSCL 17/8

At the present time the U.S. Army is striving to attain around-the-clock operational capability for its tactical forces. The Night Vision Goggles have been developed to aid the Army pilot in attaining near-daytime capability at night. Previous research at the U.S. Army Aeromedical Research Laboratory has demonstrated the requirement for an investigation of the effects of low illuminance levels on aviator performance while wearing night vision goggles. Author (GRA)

N77-22806# Navy Clothing and Textile Research Unit, Natick, Mass.
PHYSIOLOGICAL TESTING OF WHITE PHOSPHOROUS PROTECTIVE CLOTHING
Dale A. Reins and James C. Shampine. Oct. 1976 30 p refs
(AD-A033027; TR-116) Avail: NTIS HC A03/MF A01 CSCL 06/17

The physical stresses imposed on personnal wearing the white phosphorous protective clothing (WPPC) in hot climates were ascertained. Clothing was worn in ambient temperatures of 100 and 120F during light and moderately heavy work periods. Clothing was worn with the flaps open and closed. The length of time that this clothing system may be worn depends upon specific activity and ambient temperatures. When it is worn under conditions similar to those of these tests, a time limitation of 45 and 90 minutes prevails for 120 and 100F, respectively, when RH is 50% or less. The time difference between the flaps-open and the flaps-closed configurations amounts to only about 7 minutes extended exposure time at 120F, which may not be significant in light of the time needed to accomplish a designated mission. GRA

N77-22807# Omnemii, Inc., Vienna, Va.
MANNED SYSTEM DESIGN USING OPERATOR MEASURES AND CRITERIA Technical Report, 1 Apr. 1975 - 31 Oct. 1976
Edward M. Connelly and N. A. Sloan Oct. 1976 70 p refs
(Contract N00014-75-C-0810)
(AD-A032687; OTR-62-76-1) Avail: NTIS HC A04/MF A01 CSCL 05/8

In existing man-machine systems, the human operator is typically presented a predesigned display, and he must adapt his control techniques in an attempt to optimize overall system performance. Ultimate performance achieved may not rise to the designer's expectation or to the operator's capability because the design process does not account for the operator's adaptability. In this research program, ship control performance of the Officer of the Deck (OOD) was observed and analyzed in a series of simulator experiments involving ship transit and obstacle avoidance. Three types of displays were included in the analysis. OOD control rules, and measures and criteria which describe the control technique used as well as the criteria employed in controlling the ship were derived from the individual performance data. The effect of display type on the measures and criteria which were apparently optimized by the subjects was determined. Author (GRA)

N77-22817*# Connecticut Univ., Storrs.
ANALYSIS OF PILOT-AIRCRAFT PERFORMANCE AND RELIABILITY VIA THE APPLICATION OF MAN-MACHINE MODELS
David L. Kleinman *In* NASA. Ames Res. Center Systems Reliability Issues for Future Aircraft 1975 p 141-156

Avail: NTIS HC A10/MF A01 CSCL 05H

The present approach to analytic modeling, which utilizes human response theory together with modern control theory, is discussed. Analytic modeling of human performance has progressed to the point where it can be used with some confidence in the design and performance analysis of man-machine systems. An example of its use in helping design a flight director for the hover control of a VTOL vehicle is described. How the method could be used for analysis of human response to system failure is sketched. Author

N77-23712*# Kanner (Leo) Associates, Redwood City, Calif.
KOSMOS-782 POST-FLIGHT BIOCHEMICAL STUDIES OF VARIOUS ORGANS AND TISSUES OF RATS
R. A. Tigranyan Washington NASA Oct. 1976 33 p refs Transl. into ENGLISH of "Biokhim. Issled. Razlichnykh Organov i Zavershenya Kosmich. Poleta na Biosputnike "Kosmos-782"" Acad. of Sci. USSR, Moscow, Oct. 1975 26 p
(Contract NASw-2790)
(NASA-TT-F-17237) Avail: NTIS HC A03/MF A01 CSCL 06C

The Kosmos-782 biological studies used three groups of male SPF Wistar rats: one on the bio-sputnik, one housed in a vivarium and fed flight rations; and one simultaneous experimental group with flight conditions exactly reproduced except for weightlessness. The following tissues and organs were studied: blood, skeletal muscles, myocardium, brain, bony tissue, digestive system, lymphoid organs, and liver. The flight lasted 20 days. Examination of tissues and organs was made 6 to 10 hours post-flight and 26 days after completion of the experiments. Author

N77-23713*# Aeronutronic Ford Corp., Houston, Tex. Aero-Comm Engineering Service Div.
SCREWWORM ERADICATION DATA SYSTEM (SEDS) PREPROCESSOR PROGRAM DOCUMENTATION, PART 1
7 Apr. 1976 129 p ref
(Contract NAS9-1261)
(NASA-CR-147864; JSC-10019-Pt-1) Avail: NTIS HC A07/MF A01 CSCL 06C

To achieve the capability required by the Screwworm Eradication Data System (SEDS) and to process the 14-track analog tapes supplied by the National Oceanic and Atmospheric Administration, the existing Earth Resources Preprocessor Software Subsystem (ERPSS) was enhanced. A brief overview of the ERPSS is given along with descriptions of only those computer program components that were modified to meet the SEDS requirements. Author

N77-23714*# Aeronutronic Ford Corp., Houston, Tex. Space Information Systems Operation.
SCREWWORM ERADICATION DATA SYSTEM (SEDS) APPLICATIONS PROGRAM DOCUMENTATION, PART 2
2 Jul. 1976 1132 p
(Contract NAS9-1261)
(NASA-CR-147865; JSC-10019-Pt-2) Avail: NTIS HC A99/MF A01 CSCL 06C

National Oceanic and Atmospheric Administration (NOAA) satellite data, which is in analog tape form, is converted into output data products. These products are used by investigators in determining optimum areas for airdrops of steril screwworm flies over Mexico. The output product of SEDS takes the form of imagery data film slides showing Mexico and the lower southwest portion of the United States. The area analog preprocessing phase of the SEDS task is covered. Author

N77-23715*# Aeronutronic Ford Corp., Houston, Tex. Engineering Services Div.
SCREWWORM ERADICATION DATA SYSTEM (SEDS) OPERATIONAL MANUAL, PART 3
6 Jul. 1976 258 p ref
(Contract NAS9-1261)
(NASA-CR-147866; JSC-10019-Pt-3) Avail: NTIS HC A12/MF A01 CSCL 06C

All phases of SEDS operation as well as utility routines, error messages, and system disk maintenance procedures are described. Display layouts and examples of runs are included as additional explanation to SEDS program procedures. Author

N77-23716# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands)
INFLUENCE OF PIRACETAM ON PROTEIN SYNTHESIS AND ENERGY METABOLISM IN THE RAT BRAIN [DE INVLOED VAN PIRACETAM OP EIWITSYNTHESE EN ENERGIEHUISHOUDING IN DE HERSENEN VAN DE RAT]
Victor J. Nickolson and Otto L. Wolthuis Mar. 1976 27 p refs Partly in ENGLISH and partly in DUTCH
(MBL-1976-3; TDCK-67524) Avail: NTIS HC A03/MF A01

The acquisition enhancement (learning improvement) of piracetam (2-pyrrolidon-N-acetamide) was studied. To this end the protein metabolism in the rat cerebral cortex was investigated and the rat cerebral energy metabolism studied.

N77-23717# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands)
PROTEIN METABOLISM IN THE RAT CEREBRAL CORTEX IN VIVO AND IN VITRO AS AFFECTED BY THE ACQUISITION ENHANCING DRUG PIRACETAM
Victor J. Nickolson and Otto L. Wolthuis *In its* Influence of Piracetam on Protein Syn. and Energy Metab. in the Rat Brain Mar. 1976 p 1-12 refs Sponsored by Found. of Med. Res. FUNGO
Avail: NTIS HC A03/MF A01

The effect of piracetam (2-pyrrolidon-N-acetamide) on rat cerebral protein metabolism in vivo and in vitro was studied. It was found that the drug stimulates the uptake of labeled leucine by cerebral cortex slices, has no effect on the incorporation of leucine into cerebral protein, either in slices or in vivo, but inhibits the breakdown of newly formed protein in slices.
Author (ESA)

N77-23718 Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

EFFECT OF THE ACQUISITION ENHANCING DRUG PIRACETAM ON RAT CEREBRAL ENERGY METABOLISM. COMPARISON WITH NAFTIDROFURYL AND METHAMPHETAMINE

Victor J. Nickolson and Otto L. Wolthuis *In its* Influence of Piracetam on Protein Syn. and Energy Metab. in the Rat Brain Mar. 1976 p 13-25 refs Sponsored by Found. of Med. Res. FUNGO

Avail: NTIS HC A03/MF A01

The effects of piracetam (2-pyrrolidon-N-acetamide), naftidrofuryl, oxalate of N-diethylaminoethylester of beta-(1-naphtyl)-beta'-(2-tetrahydrofuryl)isobutyric acid, and methamphetamine on several parameters of cerebral energy metabolism were studied. Neither piracetam nor naftidrofuryl affected the cerebral contents of adenine nucleotides, and, accordingly, both substances were without effect on the adenylate energy charge. Methamphetamine also had no effect on cerebral adenine nucleotides. Piracetam increased the activity of adenylate kinase (EC.2.7.4.3) in isotonically diluted rat brain homogenates without altering the K sub M of the enzyme for ADP as substrate. It is concluded that although piracetam has no effect on the cerebral energy metabolism under normal conditions, it may have a beneficial effect under marginal conditions such as those met during hypoxia, by virtue of its adenylate kinase stimulating action. It is suggested that this action is responsible for the protective effect of piracetam against cerebral hypoxia. It may also be related to the enhancement of acquisition under training conditions where cerebral energy metabolism is disturbed. Author (ESA)

N77-23719# Hebrew Univ., Jerusalem (Israel). Dept. of Physical Chemistry.

ACTION OF RADIATIONS ON SOME BIOLOGICAL MODEL SYSTEMS Technical Progress Report, 1 Oct. 1975 - 1 Jun. 1976

G. Stein 1976 14 p

(Contract E(11-1)-3009)

(COO-3009-25) Avail: NTIS HC A02/MF A01

The topics investigated include: investigation of the action of ionizing radiation on enzyme proteins, using the technique of pulse radiolysis; the use of fast nanosecond laser pulse techniques in the study of biochemical and biological model systems; and the action of ionizing radiation on mammalian cells, particularly at low doses. Using chromatin as the model substance, radiation biological processes at the nucleoprotein level were investigated. ERA

N77-23720# Aerojet Liquid Rocket Co., Sacramento, Calif.

STORABILITY INVESTIGATIONS OF WATER, LONGTERM STORAGE EVALUATION Annual Report, 1 Oct. 1975 - 30 Sep. 1976

E. M. VanderWall and G. R. Janser Dec. 1976 65 p refs

(Contract F04611-72-C-0062)

(AD-A034796; AFRPL-TR-76-95; AR-3) Avail: NTIS HC A04/MF A01 CSCL 13/2

The objective of this program is to gather data that will permit the Air Force to assess the long term storage characteristics of water, particularly with regard to formation of particulate matter, so that the feasibility of long-term storage of water for use as a transpiration coolant can be determined. Five metallic materials of construction are included in the program: 304 stainless steel, A-286 (aged) steel, 17-4 (aged) stainless steel, Inconel 718 (aged), 6Al-4V titanium (STA). Two types of water are used in the program: oxygen-saturated, deionized, filtered, and oxygen-free, deionized, filtered. Five-year storage tests have been initiated in 304 and 17-4pH stainless steels, A-286 steel, Inconel 718, and 6Al-4V titanium (STA) containers using the filtered, deionized waters. Evaluation of water and containers stored for thirty months and thirty-six months has been completed. The data show that both oxygen-saturated and oxygen-free water can be stored in appropriate metal containers for the selected time periods without detrimental particulate matter formation or significant changes in the quality of the water. It is in excellent condition for transpiration coolant purposes. Author (GRA)

N77-23721# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, NO. 2, 1977

O. G. Gazenko, ed. 4 May 1977 132 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 90 p

(JPRS-69045) Avail: NTIS HC A07/MF A01

The following articles are considered: the selection and training of cosmonauts; evaluation and analysis of accumulated data to facilitate the on-going transition from orbital to interplanetary flight; research aimed at guaranteeing safety on long flights and reliability of the human component of the man spaceship system; space psychology and physiology; environmental problems and control; and telemetry.

N77-23722# Joint Publications Research Service, Arlington, Va.

CURRENT STATUS OF SPACE BIORHYTHMOLOGY

B. S. Alyakrinskiy *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 1-14 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 3-12

Avail: NTIS HC A07/MF A01

The hazard of disruption of circadian rhythms in view of orbital flights was examined in the light of data in general biorhythmology obtained from studies of the effects on man of changing latitudes, working on evening and night shifts, and in the Arctic region. All of the studies demonstrated impairment of the initial state of the body, varying in degrees: sleep disorders, poor appetite and affect, impaired function of the gastrointestinal tract, neurotic symptoms, and occasionally organic disease. Author

N77-23723# Joint Publications Research Service, Arlington, Va.

BIOMEDICAL RESEARCH ON THE PROBLEM OF ARTIFICIAL GRAVITY

A. R. Kotovskaya, R. R. Galle, and A. A. Shipov *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 15-24 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 12-19

Avail: NTIS HC A07/MF A01

The effects on the human body of prolonged (up to one month) stays in a rotating system were investigated. It was established that it is possible, in principle, for man to exist in an object that rotates at a constant angular velocity. Efficiency is retained and there are no health endangering disturbances. Author

N77-23724# Joint Publications Research Service, Arlington, Va.

RESULTS OF CLINICAL EXAMINATION OF COSMONAUTS FOLLOWING A 63-DAY FLIGHT

A. V. Beregovkin, T. N. Krupina, G. D. Syrykh, M. M. Korotayev, N. A. Kuklin, V. A. Balandin, V. S. Znamenskiy, V. I. Nikiforov, V. V. Nistratov, and V. D. Portnov *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 25-28 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 19-22

Avail: NTIS HC A07/MF A01

In two Soviet cosmonauts, the preflight bioelectrical activity of the myocardium showed no appreciable deviations from normal; both cosmonauts presented only isolated extrasystoles, which were recorded during some studies at rest and during the load tests. In flight, the rhythm of cardiac contractions was constantly sinusoid, with moderate sinus arrhythmia. During the period of putting the spacecraft in orbit, as well as during flight, some extrasystoles were recorded; their appearance was usually preceded by emotional or physical tension. Author

N77-23725# Joint Publications Research Service, Arlington, Va.

ELECTROGRAPHIC EXAMINATION OF THE CREW ON THE SECOND EXPEDITION OF SALYUT-4

M. M. Korotayev, I. I. Popov, V. A. Degtyarev, Z. Z. Borofeyeva, A. D. Yegorov, V. V. Kalinichenko, S. I. Ponomarev, V. P. Sidorov, A. P. Polyakova, Z. A. Golubchikova et al. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 29-33 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 22-26

Avail: NTIS HC A07/MF A01

Cosmonauts' EKG's were analyzed during and after a prolonged orbital flight, using both DS leads and the classical leads used in clinical practice. The EKG was recorded both at rest and while the cosmonauts performed functional tests on a bicycle ergometer with loads of 350 to 450 kg-m/min lasting 5 min. Polinom equipment was used to record the EKG; it permitted synchronous recording of 3 EKG leads, calibration of the signal, transmission of data over telemetry channels and recording on the onboard magnetic tape storage devices. Author

N77-23726# Joint Publications Research Service, Arlington, Va.

CHANGES IN HEMODYNAMICS AND PHASIC STRUCTURE OF THE CARDIAC CYCLE IN THE CREW ON THE SECOND EXPEDITION OF SALYUT-4

V. G. Doroshev, T. V. Batenchuk-Tusko, N. A. Lapshina, Yu. A. Kukushkin, N. D. Kalmykova, and V. N. Ragozin. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 34-39 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 26-31

Avail: NTIS HC A07/MF A01

In preparing for the flight of the Salyut-4 orbital research station, a bicycle ergometer was installed on board for the purpose of functional tests with a physical load. The test involving a physical load was conducted using an analogue of the onboard bicycle ergometer in the preflight and postflight periods. During the flight on the Salyut-4, the crew members did not experience any subjective discomfort. The exercise performed by the cosmonauts constituted 2,100 to 2,200 kg-m/m in 5 minutes at the pedaling rate of 56 to 60 r/minute. The results of this study confirmed the fact that, in weightlessness, the reaction of the circulatory system remains at about the preflight level.
Author

N77-23727# Joint Publications Research Service, Arlington, Va.

DYNAMICS OF VENOUS CIRCULATION IN COSMONAUTS ON THE SECOND EXPEDITION OF SALYUT-4

Ye. M. Yuganov, V. A. Degtyarev, A. S. Nekhayev, T. V. Batenchuk-Tusko, Ye. A. Kobzev, V. S. Bednenko, and S. V. Ivanova. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 40-48 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 31-37

Avail: NTIS HC A07/MF A01

Venous circulation was investigated in the crew of the Salyut-4 orbital research station, obtained on the basis of analysis of graphic tracings of jugular vein pulsation. The dynamics of form of pulsograms and venous blood pressure were observed. The duration of phases of the right heart was measured. Author

N77-23728# Joint Publications Research Service, Arlington, Va.

EVALUATION OF PULSE RATE DYNAMICS IN MEMBERS OF THE SECOND CREW OF SALYUT-4 AT REST AND DURING INFLIGHT PERFORMANCE OF FUNCTIONAL TESTS

O. G. Itsekhovskiy, A. P. Polyakova, and V. R. Lyamin. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 49-54 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 37-42

Avail: NTIS HC A07/MF A01

The pulse rate response of cosmonauts during the Salyut-4 flight, both at rest and during functional tests with LBNP (lower body negative pressure) and physical exercise on a bicycle ergometer, was studied. American specialists conducted analogous studies during the flight of the Skylab orbital station. Author

N77-23729# Joint Publications Research Service, Arlington, Va.

PREDICTION AND ANALYSIS OF COSMONAUTS' PULSE RATE BY THE METHOD OF EXTRAPOLATION MODELING IN THE CLASS OF DIFFERENTIAL EQUATIONS

V. K. Vasilyev, A. A. Guyev, A. B. Savvin, and Yu. M. Svirezhev. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 55-62 ref Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 42-47

Avail: NTIS HC A07/MF A01

Use of the method of extrapolation modeling in the class of differential equations was quite acceptable to solve tasks dealing with prediction of dynamics of physiological indices of cosmonauts in the course of prolonged flights. The forecast error was close to the errors made by medical experts. With increase in forecast time from 1 to 3 days, there was negligible change in error. This confirms the fact that the selected model in the form of equation describes the dynamics of pulse rate rather well. For comparison purposes, along with the model, algebraic polynomials to the power of 4.7 were used to predict the pulse rate of cosmonauts. In this instance, there was significant increase in errors with increase in number of days for which the forecast was made. Author

N77-23730# Joint Publications Research Service, Arlington, Va.

RESULTS OF METABOLIC STUDIES ON THE CREW OF THE SECOND EXPEDITION OF THE SALYUT-4 ORBITAL STATION

R. A. Tigranyan, I. A. Popova, M. I. Belyakova, N. F. Kalita, Ye. G. Tuzova, L. B. Sochilina, and N. A. Davydova. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 63-70 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 48-53

Avail: NTIS HC A07/MF A01

The biochemical studies conducted according to the program of the second expedition of the Salyut-4 orbital station were directed toward extensive investigation of metabolism of the principal systems in the organism of a man who was exposed for a long time to the complex set of space flight factors, as well as changes observed at the early stages of readaptation to earth's gravity. Author

N77-23731# Joint Publications Research Service, Arlington, Va.

EFFECTS OF 22-DAY SPACE FLIGHT ON LYMPHATIC ORGANS OF RATS

G. N. Durnova, A. S. Kaplanskiy, and V. V. Portugalov. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 71-75 refs Transl. into ENGLISH from Rosm. Biol. Aviakosm. Med. (Moscow), 1977 p 53-57

HC A07/MF A01

The effects of space factors, and first of all of weightlessness, on the system of lymphatic organs with hemopoietic and immunocompetent functions were investigated. The spleen, thymus, and inguinal lymph nodes of 14 rats were studied that had spent 22 days onboard the artifical earth satellite, Kosmos-605 and were sacrificed 2 and 27 days after this flight, and 12 rats from a ground-based model experiment, in which all of the space flight conditions, with the exception of weightlessness, were simulated, also sacrificed at the same times. The lymphatic organs of 23 rats kept in a vivarium for the duration of the experiment served as a control. Author

N77-23732# Joint Publications Research Service, Arlington, Va.

INTESTINAL AUTOFLORA OF TEST SUBJECTS IN THE COURSE OF A 6-MONTH BIOENGINEERING EXPERIMENT

M. S. Rerberg, N. S. Manukovskiy, and L. A. Somova *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 76-79 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 57-59

Avail: NTIS HC A07/MF A01

The intestinal microflora of four subjects who stayed in a BIOS-3 closed system of life support for a long time was studied. The effects of conditions in the BIOS-3 system on the intestinal microflora of man was determined. The studies were continued for 6 months. Subject T. remained in the BIOS-3 system for the entire 6 months, P. for the first 3 months, B. for the last 4 months, and Sh. for the first 2 and last 2 months. They were all on a mixed diet. Part of the food was delivered from the outside in lyophilized form, and the rest (bread, vegetables) was provided as a result of recycling of matter in the system. Author

N77-23733# Joint Publications Research Service, Arlington, Va.

RHEOGRAPHIC STUDY OF THE HUMAN CARDIOVASCULAR SYSTEM WITH EXPOSURE TO HIGH PRESSURE FOR MANY DAYS

L. I. Ardashnikova and L. A. Chudnovskaya *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 80-86 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 60-64

Avail: NTIS HC A07/MF A01

In the presence of elevated pressure and respiration of compressed air or nitrogen and oxygen mixtures, changes occured in various vascular regions and, first of all, in the pulmonary circulatory system due to the higher density of the gas environment. The rheographic index (RI) and index of blood delivery to the brain, as well as to the legs, differed little at rest under 5 atm(abs) pressure. However, there were rather significant fluctuations of the index on different days. After exercise, the increase in RI and pulsed delivery of blood to the brain was more marked under hyperbaric conditions in four out of the six subjects. There were significant individual fluctuations detected. S.M.

N77-23734# Joint Publications Research Service, Arlington, Va.

EVALUATION OF EFFECTIVENESS OF MUSCULAR ELECTROSTIMULATION FOR THE PREVENTION OF DISORDERS RELATED TO PROLONGED RESTRICTION OF MOTOR ACTIVITY IN MAN

M. A. Cherepakhin, L. I. Kakurin, Ye. I. Ilina-Kakuyeva, and G. T. Fedorenko *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 87-91 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 64-68

Avail: NTIS HC A07/MF A01

The efficacy of electrostimulation of muscles combined with physical exercise, as well as without exercise, was evaluated. Bed rest was the model of weightlessness. The Tonus-2 apparatus was used for electrostimulation. Two series of studies were pursued, each lasting 7 weeks. The subjects stayed in bed in an antiorthostatic position. Muscular atrophy is prevented by means of electrostimulation; however it does not prevent deconditioning of the cardiovascular system. Endurance training, combined with electrostimulation, elicited a distinct preventive effect. S.M.

N77-23735# Joint Publications Research Service, Arlington, Va.

EXPERIMENTAL EVALUATION OF RELATIONSHIP BETWEEN PULMONARY BLOOD FLOW, FLUID-ELECTROLYTEMETABOLISM AND ORTHOSTATIC REACTIONS OF MAN

I. D. Pestov, Kh. Kh. Asanov, B. F. Asyamolov, V. A. Karpusheva, I. I. Kasyan, V. S. Panchenko, and V. I. Stephantsov *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 92-98 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 68-74

Avail: NTIS HC A07/MF A01

The quantitative correlation between delivery of blood to the pulmonary circulation and regulation of fluid-electrolyte metabolism, which is the basis of the Henry-Gauer reflex, was confirmed and defined. Facts were obtained that were indicative of disproportionate correlations between changes in fluid metabolism and orthostatic stability. Author

N77-23736# Joint Publications Research Service, Arlington, Va.

SENSITIVITY OF HYPOKINETIC ANIMALS TO CENTRAL NERVOUS SYSTEM STIMULANTS

L. Ya. Kolemeyeva, V. S. Shashkov, and B. B. Yegorov *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 99-105 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 74-79

Avail: NTIS HC A07/MF A01

The effects of restricted motor activity (RMA) varying in duration on animal sensitivity to central nervous system (CNS) stimulants is investigated. Stimulants with a predominant effect on different parts of the CNS were selected. These agents were also used as pharmocological analyzers of impairment of physiological functions associated with RMA. Experiments were conducted on 1,150 white, mongrel male rats and using for CNS stimulants--caffeine, phenamine (amphetamine) and strychnine. Author

N77-23737# Joint Publications Research Service, Arlington, Va.

INVESTIGATION OF MECHANICAL ACTIVITY OF CANINE SKELETAL MUSCLES IN VIVO

V. G. Kozlova, V. S. Oganov, and A. S. Rakhmanov *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 106-110 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 79-83

Avail: NTIS HC A07/MF A01

Mechanical activity of different muscles of the dog, recorded by dynamomyography in different modes of locomotion was studied. Preliminary analysis of some quantitative correlations between strength characteristics of muscles and their electrical activity was examined. Author

N77-23738# Joint Publications Research Service, Arlington, Va.

A PORTABLE DEVICE FOR DETERMINING STATIC ENDURANCE OF RATS

A. A. Shipov and A. S. Markin *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 111-113 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 83-84

Avail: NTIS HC A07/MF A01

Determination of static endurance of over 500 male rats of different ages on the proposed device revealed that the maximum holding time is characterized by minor scatter and great stability in animals of the same weight. The advantages of this device (lack of physical stimuli, minor scatter of obtained data, simple construction, small weight, and portability) enable it to be used in studies related to changes in physical efficiency of animals under the influence of the most diverse factors. Author

1 7 0 A G 7 7 UMI

N77-23739# Joint Publications Research Service, Arlington, Va.

DIFFUSION CAPACITY OF THE HUMAN LUNGS UNDER THE COMBINED EFFECT OF HYPOKINESIA

A. N. Kotov. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 114-117 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 85-86

Avail: NTIS HC A07/MF A01

The mechanisms of changes in DL of man in the presence of hypokinesia, as well as under the combined effect of hypokinesia and hypoxia, were demonstrated. There were two groups of males who were kept on strict bed rest for 49 days. DL was determined by the steady state method using the Diffusiotest--Godart instrument. The subject alternately inhaled a mixture of air and CO and oxygen and CO. Author

N77-23740# Joint Publications Research Service, Arlington, Va.

EFFECT OF DIOXANE ON FUNCTIONAL STATE OF THE RAT'S CENTRAL NERVOUS SYSTEM

G. I. Solomin. *In its* Space Biol. and Aerospace Med., No. 2, 1977 (JPRS-69045) 4 May 1977 p 118-122 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), 1977 p 87-89

Avail: NTIS HC A07/MF A01

A toxicological study of dioxane-1,4 was made. The nature of the effect of this compound on functional state of the central nervous system, in concentrations that could be encountered under real conditions, was determined. On the basis of these tests, the threshold concentration was substantiated. These concentrations of dioxane were determined by degree of its toxicity and need to determine threshold and subliminal concentrations, with regard to biological effects, as well as levels thereof in the air of sealed chambers. Author

N77-23741 California Univ., Berkeley.

QUESTIONS OF UNIQUENESS AND RESOLUTION IN RECONSTRUCTION OF 2-D AND 3-D OBJECTS FROM THEIR PROJECTIONS Ph.D. Thesis

Myron Bernard Katz 1976 162 p

Avail: Univ. Microfilms Order No. 77-4493

Questions of uniqueness and sensitivity to noise are resolved for reconstructions on a grid or raster, and are found to be critically related to the resolution attempted. Nonuniqueness can only occur if the attempted resolution is too fine; in that case, a complete description of all possible reconstructions is given. Sensitivity to noise is resolved by a method which permits a computation of the optimal projection angles which minimize the variance in the estimate of the reconstruction when noisy data are utilized. It is shown that the extent to which an object is determined by its projection data depends on how an approximation is defined i.e., the resolution of a reconstruction. It is shown that once physically justifiable assumptions are made, it is possible to predict how well a reconstruction approximates the original unknown function. The presented theory can also be applied to reconstruction on finite demensional spaces other than the space associated with a grid. Dissert. Abstr.

N77-23742 Connecticut Univ., Storrs.

A NON-EQUILIBRIUM THERMODYNAMIC THEORY OF MUSCLE TENSION DEVELOPMENT Ph.D. Thesis

Robert Walter Bass 1976 93 p

Avail: Univ. Microfilms Order No. 77-4248

A non-equilibrium thermodynamic analysis of the time varying concentration of Calcium ions in the myoplasm of striated muscle fiber is presented. Relationships are shown between the forces and fluxes of Calcium ions and the dissociation of ATP for the case of unstimulated muscle. It is shown that the phenomenon of electrical stimulation of muscle and the resultant time varying response can be obtained by examination of the phenomenological coefficients which describe the sarcoplasmic reticulum membrane porosity. Since muscle contraction is a direct consequence of the concentration of Calcium ions in the myoplasm, the analysis yields time varying muscle tension. Pertinent constants and initial values are evaluated from the data available in the literature. It is shown that the use of these numerical values yields a time varying tension for an isolated electrical stimulus similar to that observed experimentally. Furthermore, the theory yields the fused twitch and tetanic contraction observed experimentally when the electrical stimulation frequency is increased. Dissert. Abstr.

N77-23743*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

INDUCTION POWERED BIOLOGICAL RADIOSONDE Patent Application

Thomas B. Fryer, inventor (to NASA) Filed 12 May 1977 26 p

(NASA-Case-ARC-11120-1; US-Patent-Appl-SN-796256) Avail: NTIS HC A03/MF A01 CSCL 06B

An induction powered implanted monitor was designed for epidurally measuring intracranial pressure and telemetering the pressure information to a remote readout. The monitor utilizes an L-C oscillator in which the C comprises a variable capacitance transducer, one electrode of which is a small stiff pressure responsive diaphragm. The oscillator is isolated from a transmitting tank circuit by a buffer circuit and all electric components in the implanted unit except an input and an output coil are shielded by a metal housing. NASA

N77-23744# Interuniversitair Reactor Instituut, Delft (Netherlands).

COMPARATIVE INVESTIGATION OF TRACE ELEMENTS IN HUMAN BLOOD [VERGELIJKEND ONDERZOEK VAN SPOORELEMENTEN IN MENSELIJK BLOED]

J. J. M. DeGoeij, P. S. Tjioe, C. Pries, and J. H. L. Zwiers 1976 47 p refs In DUTCH Prepared jointly with Central Lab. TNO

(IRI-133-76-10) Avail: NTIS HC A03/MF A01

Five different neutron activation analysis methods for the determination of trace elements in human blood were compared. In procedure 4 the samples are irradiated directly without chemical separation, and the induced radioactivity is measured with a Ge(Li) detector. This method was found to be excellent for the determination of bromine, potassium, sodium, rubidium, and iron. With procedures 1 and 5, certain quantities of the non-radioactive elements to be determined are added and, after destruction, the elements are separated by distillation and column chromatography. The radioactivity is measured with a NaI(Tl) scintillation crystal. This method is suitable for antimony, copper, mercury, selenium, iron, and zinc. For the determination of cobalt, molybdenum, and nickel the more sensitive methods 2 and 3 are used, which in combination with procedures 1 and 5 allow the quantitative determination, in 1 ml blood, of the 14 important trace elements, antimony, arsenic, bromine, cadmium, cobalt, gold, copper, mercury, molybdenum, nickel, rubidium, selenium, iron, and zinc. ESA

N77-23745# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

THE DIAGNOSTICS OF BONE AND JOINT CHANGES DURING COMPRESSED AIR LABOR Ph.D. Thesis - Bonn Univ.

Gerhart Fuchs 26 Oct. 1976 77 p refs In GERMAN; ENGLISH summary

(DLR-FB-76-53) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 34.90

A detailed presentation of the pathogenesis, symptomology, and treatment of decompression sickness is given and the causes for secondary bone damages are described. The central problem is the extensive and exact recognition of the secondary bone damage. Various relevant publications are critically reviewed and possible consequences are discussed. Author (ESA)

N77-23746# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

EXPERIMENTAL INVESTIGATIONS ON CHANGES OF THE BONE AND JOINT STRUCTURE IN ANIMALS AFTER EXPOSURE TO HYPOBARIC ENVIRONMENTS Ph.D. Thesis - Bonn Univ.

Thomas Gilfert 26 Oct 1976 35 p refs In GERMAN; ENGLISH summary
(DLR-FB-76-54) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 18.50

Pathological effects of decompression in the hypobaric environment of man are described, and the histological changes of the bone and joint structure in animals after exposure to hyperbaric environment are reviewed. Experimental investigations on albino rats are presented in which the pathological changes of the bone structure as a consequence of the decompression in a hypobaric environment could be proven; they are shown by illustrations of the histological section of bone and joint material. Author (ESA)

N77-23747# Dornier-System G.m.b.H., Friedrichshafen (West Germany).
DEFINITION STUDY FOR SPACELAB EXPERIMENTS IN THE FIELD OF MEDICAL FUNDAMENTALS AND RESEARCH TECHNIQUES Final Report
Erich Ull and Wolfgang Hepp Bonn Bundesmin. fuer Forsch. u. Technol. Nov 1976 183 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-391)
(Contracts BMFT-WRT-1074; GfW-RV-21-V-55/74)
(BMFT-FB-W-76-15) Avail: NTIS HC A09/MF A01; ZLDI, Munich DM 38.45

Investigations on potential influences of Spacelab parameters on physiological and medical functions have revealed the possible use of Spacelab for medical tasks. A number of biomedical experiment proposals, defined during the course of the study in discussions with medical doctors, are presented. A first listing of instruments necessary to conduct the experiments in Spacelab is given and various activities to prepare Spacelab experiments are proposed. Author (ESA)

N77-23748# Rutgers Medical School, Piscataway, N. J.
MULTI-ELECTRODE TIME-MULTIPLEX TELEMETRY Final Report, 1 Oct. 1975 - 31 Oct. 1976
Sid Deutsch Jan. 1977 21 p refs
(Contract N00014-76-C-0241)
(AD-A034134) Avail: NTIS HC A02/MF A01 CSCL 06/2

Two multi-electrode time-multiplex telemetry units and their decoders are described: first, a 15-electrode totally-implanted unit that has a basic cycle rate of 400 Hz, and second, a 7-electrode partially-implanted unit that has a basic cycle rate of 4000 Hz. A remote 7-electrode stimulator-monitoring unit is briefly mentioned. Author (GRA)

N77-23749# School of Aerospace Medicine, Brooks AFB, Tex.
RETINAL THERMAL MODEL OF LASER-INDUCED EYE DAMAGE: COMPUTER OPERATOR'S MANUAL Final Report, Jun. 1975 - Jun. 1976
Alan R. Mertz, Bruce R. Anderson, Earl L. Bell, and David E. Egbert Nov. 1976 137 p refs
(AF Proj. 6301)
(AD-A034239; SAM-TR-76-33) Avail: NTIS HC A07/MF A01 CSCL 09/2

A user-oriented description is given of a computer program for predicting thermal eye damage caused by exposure to laser radiation. This report describes the parameters necessary to run the program and provides a suggested range of values for the parameters. The input and output are described in detail, as are many of the capabilities and limitations of the program. The parameters and required input steps for a plot routine used to plot the temperature rises within the ocular structures are also presented. The architecture of the program and the interpretation of the input and output can be found in the IIT Research Institute technical report, 'Thermal Model of Laser-Induced Eye Damage' (AD-A017201). Author (GRA)

N77-23750# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
PERFORMANCE DECREMENT DURING PROLONGED NIGHT DRIVING
J. B. J. Riemersma, A. F. Sanders, C. Wildervanck, and A. W. Gaillard Aug. 1976 24 p refs Presented at the NATO Symp. on Vigilance 2: Relationships among Theory, Physiol. Correlates and Operational Performance, St. Vincent, Italy, 3-6 Aug. 1976
(Contract A74/KL/003)
(IZF-1976-14; TDCK-68563) Avail: NTIS HC A02/MF A01

In an attempt to demonstrate progressive performance decrement, an exploratory experiment was carried out in which the effects of long-term work, declining diurnal rhythm, and accumulating sleep loss converge. Subjects carried out a continuous driving task between 22.00 h and 6.00 h, preceded and followed by two driving tests of 45 minutes each. In another condition they had only the pre- and post-test and slept in between. The results show progressive decrements of performance on several performance measures, including lane drifting and two subsidiary tasks. In general, considerable recovery was observed in the post-test. Although heart rate declined and heart rate variability increased during the long nightly spell, there are strong arguments against relating heart-rate and fatigue. Suggestions for future research are discussed. Author (ESA)

N77-23751# Columbia Univ., New York. Psychophysics Lab.
HUMAN PERFORMANCE CAPABILITIES Final Report, 1 Oct. 1971 - 31 Dec. 1975
Eugene Galanter 1 Oct. 1976 36 p refs
(Contract N00014-67-A-0108-0031; NR Proj. 197-016)
(AD-A031462) Avail: NTIS HC A03/MF A01 CSCL 05/10

This is the final report that reviews the research, both experimental and theoretical, conducted by the Psychophysics Laboratory, Columbia University. Three main sections discuss (1) the measurement of utility, (2) response organization, and (3) Psychophysical scaling. GRA

N77-23752 Missouri Univ., Columbia
SIMULATION OF CARBON DIOXIDE CONCENTRATOR Ph.D. Thesis
Omar El-Farouk Abdel-Salem 1976 211 p
Avail: Univ. Microfilms Order No. 77-4880

A mathematical model is developed to model and simulate the performance of an electrochemical carbon dioxide concentrator designed for use in manned spacecraft. The analysis of the kinetic and mass transport mechanisms reduces to the solution of two nonlinear ordinary differential equations which are solved by a shooting method. Most of the parameters required by the model are estimated from independent measurements or theoretical expressions. The model simulates the carbon dioxide removal rate over the experimental range and extends calculations well beyond the experimental range. It can be used in optimum design studies. The model also calculates the concentration distributions of the different species. These are important in determining the limits of cell operation in low humidity environments and can be useful in estimating the overvoltage components in the cell. Dissert. Abstr.

N77-23753*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
KINEMATIC CAPABILITY IN THE SVDS
H. Flanders Mar. 1977 51 p refs
(Contract NAS9-15200)
(NASA-CR-151360; LEC-10246; JSC-12606) Avail: NTIS HC A04/MF A01 CSCL 05H

The details of the Remote Manipulator System kinematic model implemented into the Space Vehicle Dynamics Simulation are given. Detailed engineering flow diagrams and definitions of terms are included. Author

N77-23754*# Stanford Research Inst., Menlo Park, Calif.
A TACTILE PAGING SYSTEM FOR DEAF-BLIND PEOPLE, PHASE 2
James A. Baer May 1977 28 p
(Contract NAS2-8711; SRI Proj. 3980)
(NASA-CR-151994) Avail: NTIS HC A03/MF A01 CSCL 05H

Control logic and the on-body radio transmitter is investigated. The control logic capability and studied methods for implementing

the on-body portion of the logic in a small package are improved. A small low power, on-body transmitter was designed, developed, and tested with a wrist-strap antenna to extend the one-way communication system developed during Phase 1 to a two-way communication system. Author

N77-23755# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

A BRIEF EXPERIMENT TO COMPARE THE WEARING PROPERTIES OF TWO VERSIONS OF THE C3-MASK

W. A. Lotens. 1976. 6 p. In DUTCH; ENGLISH summary
(Contract A76/KL/079)
(IZF-1976-13; TDCK-68564) Avail: NTIS HC A02/MF A01

The wearing properties of the Canadian General Tire C3 gasmask were investigated. Subjectively perceivable differences between two versions (old (O) and new (N)) of the C3 protective mask were tested in a small scale experiment in which eight subjects performed work like walking and ergometer cycling while wearing the masks. No significant differences were found in wearing properties of the masks. Neither did the skin temperature of the face differ very much (N only 0.1 C cooler than O). This, together with the impressions obtained, led to the conclusion that N will certainly not be worse than O. In fact, negligent fitting of the mask will probably have more effect than the differences between the masks. Author (ESA)

N77-23756# Arizona State Univ., Tempe. Coll. of Education.

AN AUTOMATED MEASUREMENT TECHNIQUE FOR EVALUATING PILOT SKILL Interim Report

Brian D. Shipley. Feb. 1976. 135 p. refs
(Grant AF-AFOSR-2900-76)
(AD-A033920; TN-60229; AFOSR-76-1253TR) Avail: NTIS HC A07/MF A01 CSCL 05/9

This dissertation seeks to discover specific indicators of performance skill in pilot training. An algorithmic, performance state evaluation model was developed for an instrument flight maneuver with performance times and deviations from a standard flight path as indicators of skill. The algorithm's initial procedures and these indicators were used in 3 empirical investigations. The first showed that performance times can be used to enable an observer to discriminate between performances or performance states in performances by two experienced pilots. In the second investigation, means of total performance time were found to discriminate between differences in treatments used in a training experiment with student pilots as subjects; and a priori predictions of differences in effects of these treatments on variability of group performances at a specified location were significant. In the final investigation, support was found for the hypothesis that a small set of specific indicators could be used to replace a summary indicator of variability in performances. Results of stepwise regression analyses indicated that 7 of 12 specific indicators could be used to account for 34 percent to 82 percent of the variance in the summary indicator over 6 performance trials. GRA

N77-23757# Human Engineering Labs., Aberdeen Proving Ground, Md.

AN AUDITORY-VISUAL INTERACTION MODEL FOR MONITORING ARMY MATERIEL/INFORMATION DISPLAYS Final Report

Lynn C. Oatman. Dec. 1976. 22 p. refs
(AD-A033865; HEL-TM-37-76) Avail: NTIS HC A02/MF A01 CSCL 05/8

In many military operations such as in command or air-traffic-control centers, great quantities of information are displayed to the operators simultaneously. This paper discusses the process of selective attention. It reviews recent models of information processing, and suggests a model of auditory-visual interactions which describes the processes that might underlie selective attention. The model suggests that a central processor allocates capacity for processing important sensory messages in preference to others. The model suggests how the human operator can routinely operate in an environment where many signals compete for attention, where time available for dealing with each signal is limited and where the required precision of analysis changes continuously. GRA

N77-23758# Calspan Corp., Buffalo, N.Y.

PERFORMANCE EVALUATION OF THE NHTSA ADVANCED S SERIES 50TH PERCENTILE ANTHROPOMORPHIC DUMMY. VOLUME 2: ACCELERATOR SLED TEST DATA Final Report, Jun. 1975 - Jul. 1976

Daniel E. Massing and Phyllis E. Yates. Nov. 1976. 518 p. 2 Vol.
(Contract DOT-HS-5-01260)
(PB-263650/4; CALSPAN-ZS-5778-V-2; DOT-HS-802094) Avail: NTIS HC A22/MF A01 CSCL 13F

The dynamic performance repeatability of the NHTSA 'S' Series dummy was evaluated in four different sled test configurations. Type-2 belt, preinflated air bag, energy absorbing steering column, and Type-1 belt with simulated instrument panel test environments were utilized to measure the performance of two identically fabricated dummies. In addition, a Part 572 dummy with Type-2 belts was tested to establish a control data set for the configuration. The graphical results of a statistical analysis performed on the results obtained from replicate tests of each configuration are presented. GRA

N77-23759# Maryland Univ., College Park. Dept. of Computer Science.

THE CAUSAL PRESENTATION AND SIMULATION OF PHYSICAL MECHANISMS

Chuck Rieger and Milt Grinberg. Nov. 1976. 137 p. refs
(Contract N00014-76-C-0477)
(AD-A034194; TR-495) Avail: NTIS HC A07/MF A01 CSCL 09/2

This paper describes a theoretical framework and a LISP implementation for describing and simulating the cause-effect behavior of mechanisms. For the purposes of this research, a mechanism is defined to be any physical device, complex or simple, which exhibits cause and effect relationships useful to humans. Ordinarily, this will mean any purposively constructed object, such as a vacuum cleaner, a pencil, a button, a lightbulb or a computer. However, the authors also include in the definition any naturally-occurring physical devices and principles whose cause and effect relationships are of use to humans. Also considered are information-manipulating 'mechanisms' such as computer programs, as though they were physical in nature. GRA

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